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## DISEASES CAUSED BY BACTERIA AND FUNGI.

NEUFELD, I. (1931). Die Typenfrage in der Bakteriologie. [**The Question of "Types" in Bacteriology**].—*Zlb. Bakt. I.* (*Orig.*). **122.** 104-111.

This paper, which was read before the German Congress for Microbiology at Heidelberg in May, 1931, is a survey of the question of the occurrence of types among bacteria. The author first deals with tubercle bacilli and points out that, although human and bovine bacilli are referred to as types, they cannot be made to change the one into the other. They are recognisable as types by the infections they produce in human beings and bovines, but they cannot be distinguished by serological methods. There are, however, many organisms, such as pneumococci, gonococci and streptococci, which can be classed as types by serological methods. Some of these types can be changed by altering the composition of the media used for their cultivation.

A. LESLIE SHEATHER.

GORDON, J., & COOPER, K. E. (1931). **A Study of the Phosphorus Distribution in Bacterial Cultures. Part II.**—*Brit. J. Exp. Path.* **12.** 234-238. 1 table. [4 refs.]

In a previous paper, it was shown that various bacteria will hydrolyse organic phosphorus compounds present in the medium, breaking both lipin and non-lipin phosphorus down to inorganic phosphorus. In the present work, *B. coli* was grown on a medium consisting mainly of purified gelatin (phosphorus free), glucose and various inorganic salts, the only source of phosphorus being potassium dihydrogen phosphate. By chemical analysis of the medium and of the washed organisms after four days' growth, it was shown that some lipin and even more non-lipin organic phosphorus had been formed. The medium itself, free from the cells, showed no change in composition. It is concluded that the bacteria are capable of synthesising lipin phosphorus and organic phosphorus other than lipin from inorganic phosphorus.

W. R. WOOLDRIDGE.

JENSEN, L. B., & MORTON, H. B. (1931). **The Diphtheroid Phase of Streptococci.**—*J. Infect. Dis.* **49.** 425-435. 4 figs., 2 tables. [11 refs.]

From the urine of a patient suffering from chronic cystitis, the authors isolated an organism which constantly produced diphtheroid forms on blood agar,

but which, when sown into dextrose brain broth, grew as a typical streptococcus. It is stated that in the diphtheroid phase the bacteria were innocuous, but that in the streptococcal phase intravenous injection of 10 c.c. caused localisation in the urinary tract. Cultures from two animals which were killed four days after inoculation showed a similar difference of morphology and virulence according to the medium. It is stated that agglutination and absorption tests showed that the two forms were antigenically distinct. Electrophoretic mobility and the production of peroxide are also discussed.

A strain of bacteria, isolated from the blood of a patient suffering from subacute bacterial endocarditis, showed a somewhat similar but less marked phenomenon.

A. W. STABLEFORTH.

KRUPSKI, A. (1931). Weitere Untersuchungen über die Pferde-Anämien. **[Further Researches into the Equine Anæmias].**—*Schweiz. Arch. Tierhlk.* **73.** 435-442. 3 tables. [2 refs.]

In Switzerland, equine anæmia caused by a filtrable virus is uncommon, though anæmias of different etiology do occur. The author believes that anæmia is often a sequel to infection with strangles and he produces experimental evidence in support of this view. The anæmia is the result of impaired hæmopoiesis and not of destruction of formed blood cells.

The immunisation of horses against strangles is discussed : up to the present, no satisfactory method has been discovered.

J. T. E.

ROSELL, J. M. (1931). **The Bacteriology of Chronic Streptococcic Mastitis.**—*Cornell Vet.* **21.** 317-333.

The author believes that 98 per cent. of cases of mastitis in highly productive herds are of the chronic streptococcic variety and considers that it occasions a greater degree of loss than any other cattle disease. His opinions have been formed during the last three years from the examination of nearly 2,700 samples of milk from separate quarters. The streptococci conformed in general to those isolated from similar material by other workers, but differences in important particulars are frequently mentioned. Unfortunately, owing to the diffuse manner in which the results are presented, it is impossible for the reader to assess the frequency of the variations or their significance.

0·25 to 0·5 c.mm. is regarded as the maximum volume of sediment which should be obtained when 10 c.c. of normal milk at 40° C. are centrifuged at 2,500 r.p.m for 15 minutes. [Presumably by 0·5 c.mm. the author does not mean 0·0005 c.c. but 0·05 c.c.]. Microscopic examination is discussed.

383 strains of streptococci have been isolated. Frequently these appeared as diplococci or in small masses in the original secretion. Although differences in this and other characters were found, the strains are treated as of one kind and their general characters described under the following headings :—growth in broth, effect on litmus milk and 0·005 per cent. methylene blue milk, hæmolytic characters, sugar fermentation, gelatin liquefaction, splitting of hippurate, final pH in lactose and sucrose, reduction of nitrates and pathogenicity. Considering that they are described as similar to the classical *S. mastiditis* or *S. agalactiae*, the most striking findings were that action on salicin and mannite was variable, and that inulin, xylose, arabinose and even raffinose were amongst the sugars

occasionally fermented. It is also stated that they were somewhat similar to *S. cremoris*, *S. salivarius* and *S. fæcalis*. By this author, however, fermentation characters are considered to be variable and of little value. Attempts to produce mastitis artificially with 5 to 40 c.c. of culture or 1 to 4 c.c. of milk were successful. Transmission by smearing cultures on the teats was not possible. An interesting observation is that cultures which produced no marked reaction when injected subcutaneously into female guinea pigs produced a marked reaction when injected into the udder parenchyma of these animals. Both dead and living " polyvalent autovaccines " were used together with injections of milk or protein to treat 168 diseased animals, which were also given " weak formalin milk " injections and milked 3 to 5 times a day. The results are given as 77 per cent. effective, though it is not clear how this was ascertained or to what agency it was due.

There is no reason to disagree with the author when he states that much yet needs to be done with regard to the source and method of infection and the predisposing factors which may assist the establishment and progress of the disease.

A. W. STABLEFORTH.

I. THOMSON, David, & THOMSON, Robert. (1931). **The Rôle of the Streptococci in Erysipelas.**—*Ann. Pickett-Thomson Res. Lab.* **7.** 1-111 h. 25 figs. on 3 plates. 3 charts. [517 refs.]

II. THOMSON, David, & THOMSON, Robert. (1931). **An Historical Survey of Researches on the Rôle of the Streptococci in Skin Diseases.**—*Ibid.* 113-190. 5 figs. [339 refs.]

III. THOMSON, David, & THOMSON, Robert. (1931). **The Rôle of the Streptococci in Measles.**—*Ibid.* 193-411. 116 figs. [862 refs.]

These three monographs are the continuation of a series on streptococci published by the authors in volumes 4, 5 and 6 of the *Ann. Pickett-Thomson Res. Lab.* They are made up of critical historical surveys of published works together with the author's own experiences and opinions on the importance of streptococci in the particular diseases.

I. The authors summarise this paper by saying that erysipelas is undoubtedly due to a specific hæmolytic streptococcus, *S. erysipelatus*, which can be distinguished from *S. pyogenes* and *S. scarlatinae* by sugar fermentation, serological and skin reactions, the occurrence of a specific bacteriophage, and a mass of clinical evidence. A very fleeting immunity follows an attack ; relapses are common and the value of specific antisera has yet to be proved. The mortality is high in infants, and abscesses and arthritis are the chief complications. The disease has a world-distribution, but is commonest in temperate and cold climates and under unhygienic conditions.

II. In this paper it is pointed out that previous work on streptococci in skin diseases has been hampered by the insufficiency of the technique of cultural methods and a description is given of the special technique necessary in such work. The authors conclude that streptococci are definitely responsible for a number of skin diseases including impetigo contagiosa, pemphigus neonatorum, ecthyma, the onchias, streptococcal pityriasis, the intertrigos and hæmolytic streptococcus gangrene. One organism is not necessarily specific for particular diseases, as *S. pyogenes*, *S. longus*, *S. anginosus*, *S. subacidus*, *S. fæcalis* and *S. infrequens* have all been isolated. The relationship of streptococci to lupus erythematosus

and other affections is not clear, but there is sufficient evidence to justify their consideration as having some part in the etiology of these conditions.

III. In their third paper the authors consider measles. They discuss the wide bacterial flora, experimental inoculations, immunity and prophylactic treatments. From the results of their personal researches on the etiology of measles they are inclined to consider that the causative agent is an undiscovered organism which is probably a filter passer. They emphasise, however, that streptococci and other isolated organisms must be further investigated before they are dismissed from consideration.

NORMAN HOLE.

VENTURI, Piero. (1931). Rilievi sulla practica immunitaria del carbonchio ematico. **[Immunisation against Anthrax in Practice].**—*Clin. Vet. Milano.* **54.** 719-728. 1 table. [2 refs.]

The author reports the results obtained with the anti-anthrax vaccine prepared by the Milan Serum Institute. He has used the vaccine for subcutaneous inoculation and, in a smaller number of cases, for intradermal inoculation.

From the tabulated results, it appears that, during the three years 1928-1930, 468,857 animals (cattle, sheep and goats) have been vaccinated subcutaneously and 78,317 have been vaccinated intradermally.

A further set of figures divides these totals up under various headings which show the different forms of vaccine used. It would appear that only eight animals —seven goats and one sheep—died soon after the inoculations. Of the vaccinated animals, ten died of anthrax within six months of vaccination and 23 died more than six months after vaccination ; 37 cases of anthrax occurred among non-vaccinated animals.

During the same period (1928-30), 174 cases of malignant pustule were encountered.

A. LESLIE SHEATHER.

COWLES, P. B. (1931). **A Bacteriophage for** *B. anthracis.*—*J. Bact.* **21.** 161-166. 2 tables. [4 refs.]

COWLES, P. B., & HALE, W. M. (1931). **Effect of Bacteriophage on Experimental Anthrax in White Mice.**—*J. Infect. Dis.* **49.** 264-269. 5 tables. [14 refs.]

According to Cowles, no true bacteriophage active against *B. anthracis* has ever been obtained. This author has succeeded in isolating from crude sewage a bacteriophage which lyses eleven typical strains of *B. anthracis*. The sewage was filtered through paper, enriched with beef extract and peptone and mixed with the growth from an 18-hour agar slant culture of one strain. After incubation overnight the mixed culture was filtered and the usual process of alternate feeding and filtration pursued : 0·1 c.c. of the third-passage filtrate showed some ability to clear broth cultures ; after ten passages the filtrate had a titre of $2 \times 10^{-9}$, as determined by plaque counts, and caused complete lysis of broth cultures in three to four hours. The bacteriophage was active against *B. mesentericus*, but not against *B. cereus*. It was killed or inactivated by heating to 60°C. for ten minutes. Lysed culture filtered through Chamberland L3 candles showed no secondary growth even after three months at room temperature. Unfiltered broth cultures which apparently had been completely lysed sometimes showed secondary growths.

Such secondary growths produced abundant spores. If these spores were heated to 80°C. to inactivate the bacteriophage and kill vegetative organisms, the resultant growth on agar was similar to that of a normal culture, but the organisms were resistant to bacteriophage. Both susceptible and resistant strains were pathogenic to mice and, when recovered from the mice, retained their specific behaviour to the lytic principle. The development of secondary growth appeared to be dependent on the number of organisms in the culture mixed with the bacteriophage. Cowles suggests that a small percentage of cells resistant to lytic action were included in the culture from which secondary growths were obtained.

Few studies have been made on the use of bacteriophage as a therapeutic agent in natural laboratory animal diseases and the results have not been encouraging. Cowles and Hale have worked with mice infected with *B. anthracis* because (1) anthrax occurs as an infection through abrasions in the skin or mucous membrane and may therefore be considered a natural infection ; (2) white mice are very susceptible, and (3) a potent anti-anthrax bacteriophage was available. They tried the effect of leaving bacteriophage and bacteria in contact for varying times before injection, of mixing immediately before injection and of injecting bacteriophage 25 minutes to one hour before inoculation of the bacteria.

The most favourable results occurred when the bacteriophage and bacteria were left in contact for 35 minutes before inoculation. The authors came to the conclusion that " fixation " of the bacteriophage on the bacteria was the important factor, and showed that exposure of the mixture to conditions unfavourable for the reaction resulted in a lack of " fixation " and therefore failure to protect the mice. They also noted that the presence of bacteriophage in the body had a detrimental rather than a beneficial effect, as mice inoculated with both bacteria and bacteriophage (not mixed prior to inoculation) succumbed more quickly than mice receiving bacteria alone. The bacteriophage was not eliminated from the body and could be recovered after death. The general conclusion was that bacteriophage does not seem able to act efficiently, if at all, in the tissues.

C. McG.

FREY, C. A., & HAGAN, W. A. (1931). **The Distribution of Acid-Fast Bacteria in Soils.**—*J. Infect. Dis.* **49.** 497-506. [12 refs.]

Hagan [(1929). *Cornell Vet.* **19.** 173.] assumed that acid-fast organisms are widespread in nature and Frey [(1930). *Science.* **71.** 366.] described a method for detecting these organisms in soil.

In the present paper the authors point out that the principal importance of certain acid-fast organisms found in, and possibly the cause of, certain lesions in the skin of cattle is that they frequently sensitize the affected animals in such a way that the beasts react as if they were tuberculous.

The suggestion that these organisms are saprophytes related to tubercle bacilli requires substantiation by the demonstration that they are sufficiently widespread in nature.

The authors give a brief historical review of the work on saprophytic acid-fast bacteria commencing with a reference to ALVAREZ and TAVEL. Different methods are described for the detection and cultivation of acid-fast organisms from soils, the medium which finds most favour with the authors being a modification of SÖHNGEN'S medium. Magnesium sulphate was used in place of magnesium usta (dehydrated magnesium oxide) which was not available.

Samples of soil were obtained from twenty different States and acid-fast organisms were detected in every sample. The organisms were placed in three groups according to their cultural characteristics, which are briefly described.

The authors state that the skin of guinea pigs can be made sensitive to filtrates of old cultures of some of these saprophytes. The sensitization was not always specific, but " it may be said that most of the animals reacted strongly to the homologous filtrates and irregularly to others."

The organisms examined, when isolated in pure culture, preserved a diversity of cultural features resembling in many instances those of well-known organisms.

G. W. DUNKIN.

TIEDEMANN, H. (1931). Ueber einen neuen aus dem Blut gezüchteten säurefesten Keim. [**A New Acid-fast Bacillus cultivated from Blood**].—*Zlb. Bakt. I.* (*Orig.*). **122.** 483-494.

The organism described in this paper was recovered from the blood of a person suffering from chorioretinitis.

The bacillus was greatly influenced by the medium used for its cultivation, changes in morphology and staining reaction being readily and repeatedly produced. It appeared to be non-pathogenic for experimental animals.

A. LESLIE SHEATHER.

SAENZ, A., & GUERRA, P. (1931). Isolement d'un bacille du type aviaire des lésions et du sang d'un tuberculeux lupique. [**The Isolation of an Avian Type of Tubercle Bacillus from the Lesions and Blood of a Patient affected with Lupus**].—*C. R. Soc. Biol. Paris.* **108.** 715-717.

The authors record the isolation of an avian strain of tubercle bacillus from the skin of a patient affected with lupus.

The inoculation of blood from the patient caused the death of a guinea pig after three and a half months. The only lesions present on autopsy were a small abscess at the site of inoculation and a slight hypertrophy of the inguinal and corresponding sub-lumbar ganglia. Pure cultures of an acid-fast bacillus were obtained from the pus grown on the usual laboratory media.

The intravenous inoculation of 1 mg. of bacilli, grown on Sauton's medium, killed rabbits constantly in from 14 to 18 days. The intravenous inoculation of 0·1 mg. to 1·0 mg. killed fowls in 18 to 25 days with typical macroscopic and microscopic lesions of avian tuberculosis.

The same organism was also isolated in pure culture on Löwenstein's medium sown directly from a fragment of the affected skin tissue of the patient.

T. M. DOYLE.

COURMONT, P., & GARDÈRE, H. (1931). Modifications de la morphologie du Bacille de Koch en cultures homogènes en présence du sérum des tuberculeux. [**Modifications in the Morphology of Tubercle Bacilli in the Presence of Anti-Tuberculous Serum**].—*C. R. Soc. Biol. Paris.* **106.** 1026-1028. [5 refs.]

By adding anti-tuberculous serum to broth cultures of tubercle bacilli, it was found possible to produce filamentous and club-shaped forms of bacilli which were considered to be analogous to those found in cultures to which antiseptics

have been added or to those found in lesions in which the conditions are unfavourable to the bacillus. Such modified bacilli may often be found in rabbit's brain, in pleural fluids and in allergic guinea pigs. As the serum appeared to be responsible for the resistant yet abnormal forms of bacilli which were found, it is assumed that the serum was responsible for the *in vivo* cases cited.

R. LOVELL.

CORPER, H. J. (1931). **The Lysis of Tubercle Bacilli** *in vitro*.—*Amer. Rev. Tuberc.* **23.** 56-65. 2 tables. [18 refs.]

A survey is given of the literature relating to the various methods, both *in vitro* and *in vivo*, by which the lysis of tubercle bacilli has been attempted.

After a number of years the author overcame the great difficulty of avoiding contamination by using a solution consisting of 6 per cent. sulphuric acid, 3 per cent. hydrochloric acid and 5 per cent. oxalic acid, and he was successful in destroying rapidly growing contaminants, including acid-fast bacilli, without detrimentally affecting the tubercle bacillus. This reagent will sterilize blocks of tissue satisfactorily without affecting the autolytic enzymes. An examination of sections of tissues containing tubercle bacilli which had been kept in 6 per cent. glycerine at 37°C. for several days gave negative results, showing that the autolysates were active against the tubercle bacilli.

Certain experiments carried out on dogs are described. Inoculations were made directly into the spleen, liver and kidneys, *via* the splenic, hepatic and renal arteries, with large doses of virulent human tubercle bacilli. After 5 to 8 hours, the desired organs were removed and cut into small blocks which were treated with the acid reagent, washed, transferred to sterile test tubes containing a few drops of sterile glycerine and then put into the incubator at 37°C. Control smears and sections were made, some portions being kept at room temperature. This procedure was repeated at weekly intervals and a lysis of tubercle bacilli was observed over a period of 2 to 4 months. Further experiments showed that both fresh and heat-killed tubercle bacilli suffer a loss of morphological integrity as gauged by their staining capacity when incubated at 37° C. in a mixture of sterilized ground spleen and liver tissue of the dog suspended in sulphuric acid, there being a numerical diminution to the point of absence in about 1 to 2 months.

The process of lysis appears to be merely a gradual digestion to which no one part of the bacillus seems to be particularly susceptible.

N. BARRON.

I. NINNI, C. (1931). Aspect de l'infection bacillaire provoquée par l'ultravirus tuberculeux inoculé en série par voie lympho-ganglionnaire. **[The Bacillary Infection produced by the Serial Inoculation of the filtrable Form of the Tubercle Bacillus into Lymphatic Glands]**.—*C. R. Soc. Biol. Paris.* **107.** 984-986. [6 refs.]

II. NÈGRE, L., VALTIS, J., & SAENZ, A. (1931). Isolement en culture des Bacilles acido-résistants issus de l'ultravirus tuberculeux en partant de Cobayes traités par des injections d'extrait acétonique de Bacilles de Koch. **[The Cultivation of Acid-Fast Bacilli, obtained from the filtrable Form of the Tubercle Bacillus, from Guinea Pigs inoculated with Acetone Extracts of Tubercle Bacilli]**.—*Ibid.* 942-943. [1 ref.]

III. Sanarelli, G., & Alessandrini, A. (1931). Passage spontané in vitro de l'ultravirus tuberculeux à travers les ultrafiltres de collodion. [**The Passage through Collodion Filters of the filtrable Form of the Tubercle Bacillus**].—*Ibid.* 443-446. [1 ref.]

I. Serial passages into the cervical glands were made at intervals of eight to ten days with suspensions of the infected cervical glands of guinea pigs which had previously been inoculated with filtrates of tubercle bacilli obtained from various sources.

After the third passage, guinea pigs which died or were killed between the 7th and 15th day showed enlargement of the cervical, inguinal or lumbar glands and a slight swelling of the spleen. Typical acid-fast bacilli were found in the glands. When the serial passages were made at monthly intervals, the inoculations set up a chronic type of disease.

II. Nêgre, Valtis and Saenz point out that most investigators have failed to obtain cultures of the acid-fast bacilli which appear in the lymphatic glands of guinea pigs inoculated with the filtrable form of the tubercle bacillus.

Purulent pleuritic fluid, which revealed no acid-fast bacilli when microscopically examined, was filtered through Chamberland L2 candles and the filtrate inoculated subcutaneously into six guinea pigs. In addition to this, three of the guinea pigs received injections of acetone extracts of tubercle bacilli.

The three guinea pigs which received filtrate alone when killed two, three and four months respectively after inoculation, showed neither lesions nor acid-fast bacilli. The three treated guinea pigs, when killed at the same intervals after inoculation, exhibited marked hypertrophy of the inguinal glands, and microscopical examination revealed the presence of numerous acid-fast bacilli.

The lymphatic glands of the guinea pigs killed at the third and fourth months respectively were crushed and mixed with dilute sulphuric acid and sown on Löwenstein's medium.

In two tubes, cultures were obtained of an organism exhibiting special characters, a report on which the authors promise in a future publication.

III. Sanarelli and Alessandrini carried out experiments to ascertain whether the filtrable form of the tubercle bacillus could be passed through collodion filters without the use of either pressure or aspiration.

Collodion sacs containing tubercle bacilli freshly grown on potato were immersed in tubes of Sauton media. At the end of two months, the medium was still perfectly clear in all the tubes. A sample of medium from each tube was inoculated intraperitoneally (5 to 10 c.c.) into young guinea pigs. Autopsy of the guinea pigs revealed the typical picture of tuberculosis caused by the filtrable form of the bacillus, *viz.*, blood stained serous fluid in the peritoneal cavity, hypertrophy of some lymph glands and of the spleen and the presence of acid-fast bacilli in the lymph glands. Primary infections with the filtrable virus are characterised by the absence of tubercles ; it is only after a second passage that tubercles appear.

The authors conclude that the filtrable form of the tubercle bacillus can pass through collodion filters.

T. M. DOYLE.

Brännström, L., Jerlov, S., & von Hofsten, G. (1931). Kurzer Bericht über die Massregeln die in England, in Dänemark, in Norwegen und in Finnland gegen die Tuberkulose des Rindes ergriffen werden. [**Brief**

**Review of the Regulations in Force in England, Denmark, Norway and Finland for the Control of Tuberculosis in Bovines**].—*Zeitschr. Infektkr.* **40.** 26-33.

This is a translation from the Swedish by BASS. As the regulations in force have been compressed to an irreducible minimum in this article, it is impossible to prepare an abstract which would be of any service.

A. LESLIE SHEATHER.

—. (1932). Les nouveaux laboratoires de recherches sur la tuberculose et de préparation du BCG à l'Institut Pasteur. [**The New Laboratories for Tuberculosis Research and the Preparation of BCG at the Pasteur Institute**].—*Ann. Inst. Pasteur.* **48.** 1-14. 8 figs.

In view of the continued expansion at the Pasteur Institute, Paris, of the various services dealing with tuberculosis, such as research work and the preparation of BCG vaccine and of antigen, a handsome new building has been erected which allows of the grouping of these services under one roof.

Eight million francs were contributed from the funds of the Pasteur Institute and two million francs were sanctioned by M. LOUCHEUR, " Ministre du Travail et de l'Hygiène " from the funds of the Pari Mutuel towards the cost of construction.

The building is rectangular in form ; it is about 228 feet in length, and comprises three stories on the side facing the rue Falguière and five on the side overlooking the Institute gardens.

The first storey is devoted entirely to the preparation and maintenance of the BCG vaccine ; the second consists of laboratories for research work and the third storey comprises laboratories for the investigation of chemical problems related to tuberculosis. The mezzanine and ground floors contain two *post-mortem* rooms, a radiological experimental laboratory and accommodation for large and small experimental animals.

The building has been carefully planned on modern lines and, in order to eliminate any possibility of the BCG vaccine becoming contaminated from extraneous sources, this section is completely separate from the other departments as regards personnel and experimental animals, etc.

The report contains three excellent photographs of the new building.

T. M. DOYLE.

—. (1932). **A Survey of BCG Vaccination.**—*Brit. Med. J.* Feb. 27th. 389-390.

This is a brief review of the discussion which took place on the paper presented by Professor CALMETTE on BCG at the Seventh Conference of the International Union against Tuberculosis held at Oslo in 1930.

CALMETTE contends that, for some days after birth, the mucosa of the small intestine is very permeable and it is on this basis that he recommends the oral administration of BCG to infants as, at this period, the bacilli are able to pass through to the mesenteric lymph glands.

This alleged permeability of the mucosa is now being questioned by certain investigators. ORSKOV, using new-born guinea pigs, could find no evidence that the bacilli passed through the intestinal mucosa. PARK reported that, of 54 guinea pigs given BCG orally, all gave negative reactions to the tuberculin test whereas 75 per cent. gave positive tuberculin reactions following either intracutaneous or subcutaneous vaccination.

The figures put forward by CALMETTE regarding the general mortality rate of infants during the first year of life were again challenged and as usual no new data were produced to prove or disprove their accuracy.

T. M. DOYLE.

PANISSET, L., & FALCHETTI. (1931). Le phénomêne d'anachorèse. [**The Phenomenon of "Anachoresis"**].—*Rev. gén. Méd. vét.* **40.** 466-472. [11 refs.]

A general review of the phenomenon of "anachoresis," so named by ASCOLI who found that subcutaneous injection of BCG was often followed by a tubercular nodule to which other bacteria were attracted and there destroyed. The authors draw attention to the similarity between this and a "fixation abscess."

In young bovines, it sometimes happens that the intravenous injection of BCG is followed by death from pasteurellosis. In this case the lesions produced in the lungs are favourable for the attraction and multiplication of pasteurella and the consequent death of the animal. On the other hand, subcutaneous inoculation of BCG produces a localization and destruction of pasteurella in the nodule. The phenomenon is not confined to pasteurellosis, but is said to occur in streptococcal infections, actinomycosis and even in virus infections. The authors therefore affirm that, whereas intravenous inoculation of attenuated tubercle bacilli may have an aggravating effect upon organisms present in an animal, subcutaneous injection has a therapeutic action.

R. LOVELL.

NÉLIS, P. (1931). Le Streptocoque exerçe-t-il une influence sur le Bacille Calmette-Guérin (BCG.)? [**Has the Streptococcus an Effect on BCG?**]—*C.R. Soc. Biol. Paris.* **107.** 1517-1519. [2 refs.]

HORMAECHE [(1930). *C.R. Soc. Biol. Paris.* **104.** 420.] had previously recorded enhancement of the virulence of BCG when inoculated into guinea pigs infected with a streptococcus. The author therefore collected 12 strains of streptococci of human and of animal origin and inoculated guinea pigs intraperitoneally with mixtures of BCG and streptococci, both pure cultures and mixtures of the latter being used.

Of 19 guinea pigs inoculated, six died within 19 days and nine died between one and a half and seven months. Lesions were present, but, although the abscesses present revealed acid-fast bacilli and streptococci, passage to other guinea pigs was unsuccessful. The remaining four guinea pigs were killed after eight to nine months and merely showed nodules in certain organs in which granular acid-fast bacilli and streptococci were found. The conclusion is drawn that the association of streptococci and BCG will not produce a modification of the virulence of the latter.

R. LOVELL.

DE BLASIO, R. (1931). Sur la perméabilité de la muqueuse digestive du Cobaye adulte aux Bacilles biliés de Calmette et Guérin (BCG). [**On the Permeability of the Digestive Mucosa of the adult Guinea Pig to BCG**].—*C.R. Soc. Biol. Paris.* **107.** 1108-1110. 1 table. [7 refs.]

Experiments were carried out to show that feeding adult guinea pigs with BCG is followed by the distribution of the organisms throughout the tissues of

the animal. The mesenteric lymph glands, the tracheo-bronchial glands, the spleen, bone marrow and the liver were examined and, from these sites, BCG was cultivated at periods from five days to the third month after feeding. For such cultivation the author prefers the malachite green medium of PETRAGNANI to the gentian violet medium of PETROFF.

R. LOVELL.

JAKHNIS, B., & CHAGALOVA, S. (1931). Nouveaux documents de la Commission ukrainienne pour l'étude de la vaccination des nouveaux-nés par le BCG. Vaccination d'un sur deux jumeaux. [**Further Results of the Ukrainian Commission on BCG. Vaccination of One of each Pair of Twins**].—*Ann. Inst. Pasteur.* **46.** 579-586. 1 table, 7 figs.

Vaccination with BCG has been on trial in the Ukraine for the past five years. The authors state that many workers have proved the innocuity of BCG and that this finding has been confirmed by the Ukrainian Commission.

In order to prove the harmlessness of BCG, the authors took 16 pairs of twins and vaccinated the smaller and weaker of each pair, leaving the other twin as a control.

In each instance the children were brought up under identical conditions and there was not the slightest evidence that the BCG had exercised any adverse effects.

T. M. DOYLE.

I. THOMPSON, L. (1932). **Occurrence of Diphtheroids in Blood Cultures.**—*J. Infect. Dis.* **50.** 69-72. 1 table. [7 refs.]

II. BÉZI, I. (1932). **A Study of Action of Saliva and Extract of Tonsils upon Diphtheria Bacillus and Diphtheria Toxin.**—*J. Immunol.* **22.** 1-17. 3 tables, 5 figs. [7 refs.]

III. ECKER, E. E., & WEED, L. A. (1932). **Studies on the Adsorption of Diphtheria Toxin to and Elution from Magnesium Hydroxide.**—*Ibid.* 61-66. [4 refs.]

IV. LOISEAU, G., & PHILIPPE, M. (1932). Importance des produits de l'hydrolyse pepsique des panses de porc et de leur temps de digestion dans la production de la toxine diphtérique. [**The Importance of the Products of peptic Hydrolysis of the Stomach of Pigs and of the Time of Digestion in the production of Diphtheria Toxin**].—*C. R. Soc. Biol. Paris.* **109.** 168-170. [1 ref.]

V. HIRSCH, W. (1932). Ueber ein farbstoffbildendes Corynebakterium. [**On a Pigment-Forming Corynebacterium**].—*Zlb. Bakt. I.* (*Orig.*). **123.** 306-308. [3 refs.]

I. Of 1,079 blood cultures, 33 (3 per cent.) gave diphtheroids. Further study of 17 strains showed great variations in morphological and cultural characters, but in individual cultures no marked alteration from the diphtheroid form was noted. It was not possible to correlate the bacteriological and clinical findings and the diphtheroids are believed to have the same significance as the saprophytic cocci in blood cultures. In one instance, a pleomorphic streptococcus was obtained from a case of subacute bacterial endocarditis.

II. From a study of the action of saliva from 14 patients, of extracts of tonsils from 18, and of extracts of certain other organs, the author concludes that

the evidence seems to indicate that some specimens of saliva may exhibit an antibacterial action against diphtheria bacilli and that saline extracts of tonsils and lymph nodes may inhibit the necrosing action of the toxin. It is not known whether the action is specific.

III. It was found that the toxin was consistently removed by adsorption with five volumes of a standard colloidal suspension of magnesium hydroxide. Adsorption was considerably more effective when molecularly dispersed magnesium chloride was used with subsequent conversion to the hydroxide in the presence of the toxin. Purified toxin, prepared from toxic broth containing 37 mg. of dried material per gramme, contained only 0·17 mg. of total solids per gramme. The raw toxin contained 3·4 antigenic units per c.c. Flocculation tests showed that the purified toxin and its filtrate each contained about 32 antigenic units per c.c. but neither was capable of immunising rabbits.

IV. The authors discuss the periods of digestion most suited to the preparation of media for the cultivation of pneumococci, gonococci and bacteria of the typhoid-paratyphoid group, and also the effect of various periods on the antigenic power of diphtheria and tetanus toxins thus prepared.

V. A diphtheroid was isolated from material obtained by puncture from the knee joint of a human patient. Colonies on a solid medium were at first colourless, small, round and shiny, but after several days became distinctly orange. Similar pigment formation occurred in broth and in gelatin which was slowly liquefied ; coagulated serum was also attacked. The organism fermented dextrose, saccharose, lævulose and mannite, but not lactose or galactose ; in the case of maltose the result was indefinite. Tests for indol formation, clotting of milk, reduction of lead acetate and for hæmolysis had a negative result. Growth was slow at room temperature.

The organisms were strongly gram-positive and not virulent for mice or guinea pigs. The pigment was insoluble in water, alcohol, benzol, ether, carbon disulphide and xylol.

A somewhat similar organism occurred as a contamination to another strain.

A. W. STABLEFORTH.

Pegreffi, G. (1931). Contributo allo Studio delle infezioni da Bac. pyogenes negli animali domestici della Sardegna. [**Infection with** *B. pyogenes* **in the Domesticated Animals in Sardinia**].—*Nuovo Ercol.* **36.** 312-322. [21 refs.]

The author has been able to detect *B. pyogenes* in lesions occurring in pigs, cattle, goats and sheep. In sheep it produces a condition resembling " ovine pyobacillosis." " Foot rot" is likely to be complicated by pneumonia and pleurisy caused by this organism.

The author refers to the variability of the morphological and biochemical characters of the bacillus and concludes that, culturally, it does not always cause coagulation of milk.

A. LESLIE SHEATHER.

Silberstein, W. (1931). Neue kulturelle Methoden zur Differentialdiagnose in der Paratyphusgruppe. [**New Cultural Methods for Differential Diagnosis in the Paratyphoid Group**].—*Zlb. Bakt. I.* (*Orig.*). **122.** 131-135.

Although the types of bacilli classified as paratyphoid A can be differentiated by appropriate immune sera, cultural differentiation is also necessary.

The author has built upon and has modified the work of BROWN, DUNCAN and HENRY in England, and of KRISTENSEN and BOJLEN in Denmark. Details are given of the composition of the basal medium employed, together with that of the various acids which were added to it.

Tabular statements show the differential behaviour of a large number of strains of the organisms tested.

A. LESLIE SHEATHER.

GÖTZE, R., & MÜLLER, J. (1931). Ueber die Bangbakterieninfektion (Brucellose) der Rinder. [**On Infection of Cattle with Bang's Bacillus**].—*Deuts. tierärztl. Wschr.* **39.** 721-731. 1 fig. [13 refs.]

The authors emphasise the value of hygienic measures and of obtaining the unremitting assistance of the owner and his staff in order to prevent infection from outside, and its spread within the herd. They conclude that for badly or chronically infected herds no alternative exists to vaccination with living culture, but note that this is not always successful and that immunity cannot be expected in less than three months after the last injection. They believe that in order to aviod accidents only non-pregnant animals should be vaccinated, and that the interval between the last injection and service should be at least 12 weeks in heifers and at least eight in cows. In their own experiments they found that feeding and injection of a calf with very large doses of living culture had no effect. Similar treatment of 40 animals, three months to two years of age, showed that a response detectable by agglutination was first evident at about five to six months of age and that, in animals one to two years of age, high titres were constantly obtainable. Provided that these animals were not served until 12 weeks later, gestation was normal. Whilst concluding that abortion may be caused at any stage of gestation by injection of living culture, the authors state that abortion is apt to be more delayed if the injection is made late in gestation and may even not occur if it is made during the last two months ; but that the effect on the mother is probably more serious if abortion occurs at a late stage. In control by vaccination it is essential to vaccinate animals regularly and at the proper time in relation to service.

It is emphasised that injection of living vaccine is only a method of transferring the stage of infection to a period of the animal's life at which it has less serious effects, and that attempts should still be made to find an efficient dead vaccine.

As the result of unsuccessful attempts to control infection with trypaflavine, trypanblue, methylene blue, targesin, naganol and tartarus stibiatus, by various routes, the authors conclude that no preparation should be considered of any value until it has been tested in infection experiments. It is believed that treatment of any kind within six weeks after calving or abortion is definitely harmful. Manual removal of retained membranes is not favoured. After full involution of the uterus has occurred, animals that have aborted may, however, be examined and the necessary measures taken.

A. W. STABLEFORTH.

CLARK, C. F. (1931). **Correlation of Blood Reactions with the Breeding Records over a Period of Years in an Abortion-infected Herd of Cattle.**—*J. Amer. Vet. Med. Ass.* **79.** 290-331. 23 tables. [1 ref.]

The data were obtained from a pure-bred dairy herd of 60 to 100 animals of breeding age in which contagious abortion has existed for 20 years. Since

1926, monthly agglutination tests have been made, breeding records kept and procedures necessary for the diagnosis and treatment of genital abnormalities carried out. The 100 animals reported were unselected except that they had been tested the greatest number of times ; the actual number of tests per animal varied from 21 to 48 and were distributed over a period of not less than two years.

The monthly agglutination tests were made by HUDDLESON'S rapid agglutination method. Sera which showed a trace at 1 : 25 or less were regarded as negative, those which reacted at 1 : 100 or over as positive.

The tables occupy 26 pages and give details regarding agglutination tests, duration of gestation and its result, and udder infection. In summarising the data, the author has grouped his animals with reference to the final agglutination result. Amongst other effects, this has made the abortions amongst the negative animals appear high, unless it is remembered that at some time certain of these animals were suspicious or positive.

It is concluded that there were two and a half times more abortions among positive than among negative animals ; that sterility was four times more frequent in suspicious animals and eight times more frequent in positive animals than in those with a negative history ; but that retention of fœtal membranes occurred with equal frequency in all groups. Sixty-two per cent. of positive animals and 11 per cent. of suspicious animals had udders infected with *Br. abortus*.

Of 18 animals which gave one or more positive reactions at 1 : 50, 7 were finally negative, 6 suspicious and 5 positive.

Of 54 animals which gave one or more positive reactions at 1 : 100, 6 were finally negative, 12 suspicious and 36 positive.

Of 9 animals positive at 1 : 50 or 1 : 100 for five to ten months, only one was finally negative, whilst of 37 animals positive at 1 : 50 or 1 : 100 on more than ten occasions none became finally negative.

A. W. STABLEFORTH.

BANG, O. (1931). Les Brucelloses animales. [**Brucella Infections of Animals**]. —*2me Congrès internat. Path. comparée*. pp. 95-122. 1 table. [67 refs.]

This is an excellent review of our knowledge concerning the infection of domestic animals with members of the brucella group of organisms and it should be read in its entirety to be appreciated. The author mentions the pioneer work of EVANS [(1918). *J. Infect. Dis.* **22.** 580.], who showed the similarity between the causal organism of contagious bovine abortion (*Br. abortus*) and that of Malta fever (*Br. melitensis*). He then draws attention to the difficulty of serological differentiation between members of the brucella group but that the addition of small quantities of dyes to media, as introduced by HUDDLESON [(1930). *Arch. Inst. Pasteur Tunis.* **19.** 391.], divides the group into three classes :—

1. *Br. abortus* which is tolerant to methyl violet (1 in 100,000) and fuchsin (1 in 25,000), but not to thionin (1 in 30,000). When freshly isolated, *Br. abortus* usually requires an atmosphere of 5 to 10 per cent. carbon dioxide.
2. *Br. suis* which is tolerant to thionin, but not to methyl violet or fuchsin.
3. *Br. melitensis* which is tolerant to all three of the dyes.

The three organisms are then dealt with in turn.

*Br. abortus* is the cause of contagious bovine abortion, and natural infection is considered to take place chiefly by the alimentary tract, although infection by the conjunctiva, skin and intravenous injection has been successful experimentally. The author considers that infection *via* the skin may be of most importance as he

has shown it to be possible experimentally, whilst infection by way of the alimentary tract requires large doses of bacilli both in guinea pigs and in cattle. The possibility of infection from bulls must not be lost sight of, as they are subject to infection and are capable of transmitting the disease.

Diagnosis may be carried out by the agglutination reaction, using either blood serum or milk, a titre of from 1 in 60 to 1 in 100 being accepted as positive. Vaccination with live cultures appears to be the only type of vaccination having any real value. Examination of milk showed that, when *Br. abortus* was present in larger numbers, there was an augmentation of leucocytes, catalase and chlorine, and a diminution of lactose. In natural cases, the brucella present in the milk do not tend to increase in numbers after withdrawal from the udder although old laboratory strains will grow in such milk when it is heated. Occasional infection of horses and dogs is noted.

*Br. melitensis* is the causal organism of Malta fever in human beings and goats. The infected goats usually show no symptoms, although introduction of the disease into a fresh, non-infected district is followed by abortion in pregnant goats and later, when the disease becomes more firmly established, by lameness and arthritis. The bacilli are found chiefly in the udder and its glands, but may also be found in the urine. Infection may take place by way of the alimentary tract or by erosions on the udder. Experimentally, the organism is infective for bovines, monkeys and guinea pigs.

*Br. suis* is the organism which appears to be responsible for abortion in swine ; outbreaks have appeared in Hungary, Germany, Russia, Denmark and in the U.S.A. Sows may be infected intravenously or *per os* ; the latter route does not always produce abortion although the placenta may be infected. In natural infection the bacilli may be found in the uterus, ovaries and mammary glands. Boars may be infected and are considered to be largely concerned in the spread of the disease.

The American strains of *Br. suis* are more virulent for the guinea pig than is *Br. abortus*, whilst the Danish strains of *Br. suis* are less so. The latter grow less abundantly and do not form sulphuretted hydrogen.

R. LOVELL.

LOTHE, H. (1931). **Some Clinical Observations on the Agglutination Test for *B. abortus* as a means of controlling Abortion and other Genital Diseases in Cows.**—*Cornell Vet.* **21.** 130-137. 2 tables.

The author discusses the value of repeated blood agglutination tests as a means of eradicating *Br. abortus* infection.

He believes that the test is capable of saving breeders considerable financial loss and is the only practicable method of controlling the disease.

T. M. DOYLE.

SACHWEH, P. (1932). Über eine Sero-Reaktion mit Meinicke-Klarungsextrakten zum Nachweis der Abortus-Bang-Infektion der Kühe. [**On a Serological Reaction with Meinicke's Extract for the Recognition of Bang Infection in Cows**].—*Tierärztl. Rdsch.* **38.** 1-5 & 22-26. 2 figs. 3 tables. [11 refs.]

In the first part of the article Sachweh discusses the various modifications of technique adopted by him and by others and the difficulties encountered.

The tables in the second article give details regarding the history and serological and bacteriological examination of 104 animals in four herds.

Meinicke's reaction and the agglutination reaction were generally in agreement except in the case of sera whose agglutination titre was 1 : 50 or less. The significance of agglutination at this titre is regarded as controversial.

In two cases, sera from animals which were shown by guinea pig inoculation to be excreting *Br. abortus* in their milk gave a positive Meinicke result and a negative agglutination result. In four other cases, animals which were proved to be excreting *Br. abortus* gave a negative result by both methods.

The author concludes that, because there are animals which harbour the organisms without developing antibodies in their sera, control measures should be directed to the detection of actual excretion rather than to the presence of antibodies.

A. W. STABLEFORTH.

WITTE, J. (1931). Ueber die Verwertbarkeit der neuen Meinicke-Klärungsreaktion (Originalreaktion nach Meinicke) für die Diagnose des infektiösen Abortus. [**On the Value of the New Meinicke Clearing Reaction (Original Reaction of Meinicke) in the Diagnosis of Contagious Abortion**].—*Berl. tierärztl. Wschr.* **47.** 841-845. [19 refs.]

After a brief summary of the results which have been obtained in the use of Meinicke's reaction in the diagnosis of various diseases, and a discussion of the modifications introduced by other workers, the author describes his technique in detail. The lipoid extract was a concentrated one prepared by MEINICKE himself; the specific antigen was prepared by heating a saline suspension of five or six strains of *Br. abortus* at 100° C. for ten minutes and centrifuging. Non-specific flocculation was distinguished by the entirely different character of the sediment obtained after centrifuging. For details the article itself should be consulted.

A total of 631 sera were examined both by the agglutination test and by Meinicke's reaction. In the case of 428 positive sera and 177 negative sera the results were in agreement (95·91 per cent.). In six cases a positive agglutination result [over 1 : 50] corresponded with a negative Meinicke. In 11 cases a positive Meinicke was obtained with sera which were classed as negative by agglutination. It must be noted, however, that these sera agglutinated at 1 : 25 to 1 : 50.

It is concluded that the lipoid fixation reaction of Meinicke is of equal value to the complement fixation or to the agglutination test for the diagnosis of contagious abortion ; that it is simple, carried out at smaller cost and easily read, and that it is therefore a suitable confirmatory test which might replace complement fixation.

The original reaction of Meinicke is to be preferred to the modification of MENCK because it is definitely specific, and doubtful results seldom occur.

A. W. STABLEFORTH.

I. LERCHE. (1931). Die Ausscheidung von Abortus-Bang-Bakterien durch das Rind und die sich hieraus ergebende Infektionsmöglichkeit des Menschen. [**The Excretion of Bang's Bacillus by the Cow and the Resultant Possibility of Infection of Man**].—*Tierärztl. Rdsch.* **37.** 755-757.

II. DALRYMPLE-CHAMPNEYS, W. (1931). **Undulant Fever Conveyed by Milk.** —*Brit. Med. J.* Oct. 3rd. 604-605. [14 refs.]

III. BEVAN, Ll. E. W. (1931). **The Correlation between Infectious Abortion of Cattle and Undulant Fever of Man.**—*Vet. Rec.* **11.** 547-548. [5 refs.]

IV. —. (1931). **Undulant Fever.**—*Ibid.* 551-552. [1 ref.]

I. A concise presentation of the more important facts regarding the excretion of *Br. abortus*, and of the methods by which human beings may be infected. Amongst these are included direct contact, and the ingestion of raw milk, cream, butter or cheese, sour milk and raw flesh. Attention is also given to the effect of the use of living vaccine on the excretion of brucella in the milk.

On many points the diverse conclusions of various workers are cited, but no bibliography is given.

II. A brief history of the infection of human beings with brucella from goats, sheep and cattle. Some details are cited in regard to the percentage of cows which are infected and excrete the organisms in the milk and the percentage of bulk samples which are contaminated. Reference is also made to the number of positive serological reactions which have been discovered in certain countries. At the time of writing, only 39 cases had been reported in Great Britain as compared with 200 during the last ten years in Rhodesia, between 300 and 400 every year since systematic search was begun in Denmark, and 1,305 cases in 1929 alone in the United States of America. It is suggested that investigation would show that, in this country, reactions and possibly actual disturbance are much more common than hitherto suspected.

III. After recalling the discovery of Evans in 1917 that *Br. abortus* and *Br. melitensis* are nearly related, reference is made to the serological work of Bevan and Orpen which was commenced in S. Rhodesia in 1921, tests being made with both types of brucella. This is followed by a summary of the author's conclusions in 1922.

Consideration is also given to the question of inagglutinability and spontaneous agglutinability of abortus strains, and to the conclusion of Ross that of eight Rhodesian strains examined two were identical with the form that has been named *Br. parabortus*.

The disproportionately high incidence of *Br. abortus* infection in Rhodesia —200 cases in ten years from a white population of 45,000—is contrasted with that in Great Britain.

IV. A brief review of the earlier reports regarding infection of man with *Br. abortus* and of the problems concerned.

A. W. STABLEFORTH.

Kristensen, M. (1931). La fièvre ondulante d'origine bovine principalement d'après les expériences faites au Danemark. [**Undulant Fever of Bovine Origin, based principally on Danish Observations**].—*2me Congrès internat. Path. comparée.* pp. 68-94. 8 tables. [38 refs.]

On the basis of the observations made in Denmark since 1927, the author discusses fully all the more important points in regard to infection of man with *Br. abortus*, and finally indicates the problems still awaiting solution.

Between April, 1927, and December, 1930, 17,778 samples of blood from 15,630 patients, most of whom were suffering from a febrile condition, have been tested, at the State Institute of Serotherapy, for agglutination of *Br. abortus*, *B. typhi* and *B. paratyphi* B.

Agglutination of *Br. abortus* at 1 : 100 or over occurred in the case of 2,450 sera from 1,647 patients. The most frequently observed titre was about 1 : 400 but a large proportion reached 1 : 1,600 or more. Agglutination of the typhoid-paratyphoid group occurred with 1,159 sera ; 32 of these also agglutinated *Br. abortus*, in most cases to a much higher titre.

Bearing on the question of the lowest dilution that should be regarded as evidence of infection the author notes that a titre of 1 : 100 obtained by his technique [(1928). *Zlb. Bakt. I.* (*Orig.*). **108.** 89.] corresponds to one of 1 : 200 or more in certain other laboratories.

Results obtained by complement fixation tests ran parallel from the qualitative point of view, 95 per cent. of positive agglutination reactions being accompanied by marked fixation of complement. Complement fixation appeared later in the disease than agglutination and also tended to disappear more slowly, being frequently detectable after several years.

In order to control the specificity of the reaction, about 6,000 sera received for Wasserman test were also tested for fixation with *Br. abortus* antigen. Some degree of fixation was obtained with less than 1 per cent. ; these reactions were not more frequent amongst the Wasserman+ sera than in others. A negative result was also obtained, both by agglutination and complement fixation, with sera from 500 other patients of whom about 200 were tuberculous.

In no case of undoubted typhoid or paratyphoid fever did the serum agglutinate *Br. abortus* in the dilutions employed and, in general, strong reactions to this organism were very rare except in cases of undulant fever. But, as already reported by THOMSEN (A), reactions of a moderate degree (by the technique in use in Kristensen's laboratory usually under 1 : 100) are given by most young veterinarians, and by 30 to 40 per cent. of others who are exposed to contact with infected animals. Reference is made to similar reports by HUDDLESON and JOHNSON, and by LENTZE.

A febrile disease accompanied by agglutination of *Br. abortus* at 1 : 100 or over is regarded as a satisfactory clinical entity and in over 100 cases full details of the course of the disease are in existence ; in about 800 other cases the details are less complete.

Brucella were cultivated from the blood of 28 patients out of about 50. Strains were also obtained in one case from a placenta, in one from both placenta and the stomach of the fœtus, and in one from an ovarian abscess.

*Br. abortus* originating from the bovine is regarded as the only common source of infection. There has been no evidence that porcine abortion is an important source of infection in Denmark.

A table is given to show that in the country districts as opposed to the capital and other towns infection is particularly frequent amongst males, indicating that contact with infected beasts is a common source of origin. Comparative figures per 1,000 individuals were :—animal attendants 14, veterinarians 5, butchers 3·3, and arable workers 1·8 ; whilst amongst those who had no particular contact with animals the figure was only 0·66. The author agrees with THOMSEN and HAXTHAUSEN that contact with a medium containing a large number of organisms and their products, often for a considerable period, gives rise to a vaccinia-like infection without characteristic fever, but accompanied by the production of agglutinins and a hypersensibility to *Br. abortus* and its products.

Infection generally appeared sporadically and there was little satisfactory evidence of the existence of strains of unusually high virulence for man.

The author considers that, for the purpose of differentiating the various types of brucella, tests for inhibition by dyes, production of hydrogen sulphide, extent of acid production from glucose and ability to grow in air are of more value than serological tests. His porcine strains, in contrast to those of American origin, did not produce hydrogen sulphide and only produced a small amount of acid from glucose.

[It may be noted here that WILSON, G. S., & MILES, A. A. (1932). *Brit. J. Exp. Path.* **13.** 1. concluded from a study of a large number of strains of brucella from various sources that the smooth forms, in contrast to the rough, could be distinguished by a quantitative but marked difference in their antigens.]

The period of incubation was one to two weeks but occasionally longer. Orchitis and epididymitis were rare. Infection appeared to have a predilection for the pregnant uterus.

In a large number of cases the evidence was insufficient to incriminate any particular source of infection, but from a consideration of 1,317 cases it is concluded that about 40 per cent. of cases were due to infection by milk and 60 per cent. to contact infection from other sources. Males, although more frequent in both groups, were relatively three times more frequent in the contact group.

In conclusion the author discusses certain questions of major importance. These include the sensitiveness and specificity of the technique used, the question whether infection with *Br. paramelitensis* is a reality or whether serum reactions are only due to the use of degenerate laboratory strains in serological tests, the probability that brucella infection in Denmark is not a new disease but a new discovery, and problems regarding the more delicate classification of the strains of brucella from various animals, methods of transmission, and degrees of susceptibility.

A. W. STABLEFORTH.

ELKELES, G. (1931). Zur Diagnose und Epidemiologie der Banginfektion des Menschen. Bemerkungen zu dem Aufsatz von H. Miessner "Infektioser Abortus des Rindes (Bang-Infektion)." [**On the Diagnosis and Epidemiology of Bang Infection of Man. Reply to Miessner**].—*Zeitschr. Fleisch- u. Milchhyg.* **41.** 322-324. [8 refs.]

MIESSNER, H. (1931). **Reply to above.**—*Ibid.* 324-325. [3 refs.]

ELKELES, G. (1931). **Final Reply.**—*Ibid.* 325-326. [1 ref.]

Elkeles takes exception to MIESSNER's earlier statements [(1931). *Deuts. med. Wschr.* **57.** 286.] that most agglutination reactions to Bang's bacillus have nothing to do with undulant fever, and to his suggestion that an unwarranted fear of milk must be the result of the publicity given to the question. He then gives the results of his own examination of 875 sera.

Eleven had a titre of 1 : 1,000 or over; all of these came from cases which were clinically typical of Bang infection. Blood cultures were made from seven cases and from three of these *Br. abortus* was obtained. One serum had a titre of 1 : 800; the case from which it came was one of typhoid but it was thought possible that a mixed infection existed. One serum agglutinated at 1 : 400, and one from a clinically doubtful case agglutinated at 1 : 200. Reactions were obtained to 1 : 50 or 1 : 100 with 16 other sera, but these were regarded as non-specific; 845 sera gave entirely negative results.

In one of the 11 clinical cases the source of infection was direct contact and in one case it was not ascertainable, but with the other nine cases contact was ruled out and consumption of fresh milk regarded as the only possible cause.

Miessner accepts a titre of 1 : 1,000 as evidence of actual undulant fever, but notes that many workers accept much lower titres which, even if distinguished from non-specific reactions, are only evidence of infection and not of disease.

He also notes that the proportion of actual to possible infections is far greater in the case of infection by contact than by ingestion of infected milk.

Elkeles emphasises the danger of raw milk and the fact that the actual number of cases due to infection from milk is much greater than from any other source.

A. W. STABLEFORTH.

—. (1931). Über die in der Zeit vom 1. Oktober 1929 bis 30. September 1930 bekanntgewordenen Infektionen des Menschen mit dem Bact. abortus Bang. [**On the Infection of Human Beings with** *Br. abortus* **between October 1st, 1929, and September 30th, 1930**].—*Reichsgesdhbl.* **6.** 440-443. 4 tables.

During the course of the government inquiry into the number of cases of infection of man with *Br. abortus*, 626 cases have been reported on the basis of serological reaction during the above period.

The greatest number (121 cases) were reported from Schleswig-Holstein which borders Denmark where infection of man is high. Further, the northern and eastern parts of Germany supplied considerably more cases than the west and south and this is believed to be traceable to the fact that large herds, which are more severely infected with contagious abortion, are more common in the northern and eastern parts. Over two-thirds of the cases were in males. Infection of children under three years of age was rare and in both sexes it was most common between the ages of 20 and 40 years. There were four deaths.

It is not yet possible to form an opinion regarding the frequency of infection followed by antibody response, but without clinical symptoms. Abortion in women was not reported.

Of the 626 cases, 124 were ascribed to direct contact with infected bovines and 211 to consumption of raw milk, whilst in 53 cases both methods were considered possible. Infection occurred nine times in those working with *Br. abortus* in laboratories. Most cases occurred sporadically. The frequency was greatest in those occupied in agriculture, particularly in dairying districts, and the danger to veterinarians is particularly mentioned ; 14 were affected.

Although the number of cases reported in Germany, 626 out of a population of 62 million, is less than in other countries, the position is considered serious and further investigation warranted in order to ascertain the cause of the increasing frequency of reports of infection.

A. W. STABLEFORTH.

Bigger, J. W. (1931). *Brucella abortus* **in Relation to Man in Ireland.**—*Vet. J.* **87.** 386-392. [6 refs.]

It is known that abortion disease is common amongst cattle in Ireland and, although no comprehensive observations are available, it appears from the results of Norris that the proportion of mixed milks containing *Br. abortus* is similar to that of other countries. Moreover the greater part of the milk is drunk in the raw state ; yet only three cases of undulant fever have been reported. It is suggested that low virulence is the probable explanation of the contrast between the number of cases detected in Ireland and other countries, and in support of this contention it is stated that, according to Norris, porcine strains have never been found in Ireland and that the strains isolated are of low virulence for guinea pigs.

The author recalls the work of CARPENTER, BOAK and CHAPMAN, who showed that *Br. abortus* agglutinins could not be demonstrated in the serum of adults who had drunk pasteurised milk containing such agglutinins, and that in New York City, where most of the milk was pasteurised, the percentage of reaction was 2·4 as contrasted with 7·3 per cent. in Syracuse (New York) and certain other places where much raw milk is taken. In agreement with these workers, Bigger concludes that the presence of *Br. abortus* agglutinins is indicative of actual invasion by the organism though no obvious symptoms may have been detected.

During 1930, 500 sera which had been submitted for Wasserman test were tested at 1 : 20 with a heat-killed suspension of *Br. abortus* from a human case. All sera were heated at 55° C. for 30 minutes and one drop was mixed with 19 drops of antigen for the preliminary test, which was read after four hours at 52° C. and standing overnight at air temperature. Exactly 100 sera (20 per cent.) showed some agglutination at this dilution and only these were tested further ; 4·4 per cent. gave some reaction at 1 : 50, and 2·0 per cent. at 1 : 125. In about half the cases agglutination was only detectable by means of a × 6 lens.

A. W. STABLEFORTH.

I. SHERA, A. G. (1931). **Four Cases of Undulant Fever.**—*Brit. Med. J.* Oct. 3rd. 605-607. 1 chart. [4 refs.]

II. HOBBS, F. B. (1931). **A Case of *Brucella abortus* Infection.**—*Lancet.* **221.** 683-685. 1 table. [7 refs.]

III. NICHOLLS, L. (1931). ***Brucella abortus* Infection.** [Letter to the Editor in connection with the paper by Hobbs.]—*Ibid.* 1324.

IV. FRAAS. (1931). Ein weiterer Fall von Bangbakterien-Infektion beim Menschen. [**A Further Case of Bang Infection in Man**].—*Zeitschr. Fleisch- u. Milchhyg.* **41.** 433-434.

I. The source of infection was not ascertained, but no direct contact with infected animals had occurred. The duration of symptoms varied from 7 to 16 weeks. In case 1 the initial agglutination titre for *Br. abortus* was 1 : 5,000 and and this dropped to 1 : 500 at the time of discharge ; in case 3 it was 1 : 2,500 and dropped to ? ; in case 4 it was initially 1 : 250 and remained at about 1 : 125, whilst in case 2 it dropped from 1 : 250 to 1 : 50. Details are given of clinical and bacteriological examinations which included tests with *B. typhosus* and *B. paratyphosus* A, B and C.

II. Intermittent pyrexia continued for 35 weeks. About 26 weeks after the onset, agglutination tests were made with *Br. abortus* and *Br. melitensis*, reactions being obtained at 1 : 50 to 1 : 125, but not usually above or below. Reactions of 1 : 50 and 1 : 150 were also shown with *B. paratyphosus* B. Clinical and bacteriological details are given.

III. It is stated that strains of *Br. melitensis*, especially if they have been subcultured many times, are liable to agglutination by sera of patients who have had pyrexia for a long period ; particularly is this so in streptococcal infections.

IV. The patient, a veterinarian, was infected during administration of living vaccine. Pyrexia and sweats occurred each night during a period of three months. His serum agglutinated *Br. abortus* at 1 : 800. After four months he was able to resume work, but a mild relapse occurred six months later.

A. W. STABLEFORTH.

I. Leavel, H. R., & Amoss, H. L. (1931). **Brucella Infection : Case Report. Cultivation of Brucella from the Bile.**—*Amer. J. Med. Sci.* **181.** 96-102. 1 chart. [10 refs.]

II. Darzine, E. (1931). Recherches sur la propagation de l'avortement épizootique de Bang chez l'homme en Lettonie. Sérodiagnostic de cette maladie. [**On the Propagation of Epizootic Abortion in Man in Latvia. Serodiagnosis**].—*C.R. Soc. Biol. Paris.* **108.** 740.

I. Literature regarding infection of the gall bladder and fæces of guinea pigs is reviewed. Brucella was isolated from the bile and stools of one case by a method previously described. [(1929). *J. Amer. Med. Ass.* **93.** 170]. After cholecystectomy, brucella was no longer demonstrable. It is suggested that the gall bladder is possibly a common seat of infection and responsible for chronic manifestations.

II. Of 1,100 sera which were tested at Riga in dilutions of 1 : 100 to 1 : 200 with *Br. abortus*, 18 (1·6 per cent.) gave positive results.

It is stated that from pus taken from the leg of one reactor a strain of *B. proteus* was isolated which was agglutinated by the patient's serum, and which in absorption tests behaved similarly to *Br. abortus*, though it is noted that the antigenic power of the two organisms was not identical. Other strains of *B. proteus* have been obtained which were agglutinated by sera which agglutinated *Br. abortus*.

A. W. STABLEFORTH.

I. Manson-Bahr, P. (1932). **Clinical Cases.** *Brucella abortus* **Fever.**—*Trans. Roy. Soc. Trop. Med. Lond.* **25.** 225-226.

II. Dalrymple-Champneys, W. (1932). **Undulant Fever in the British Isles.**—*Brit. Med. J.* Jan. 30th. 215-216. [5 refs.]

III. Wilson, G. S. (1932). **Undulant Fever in the British Isles.**—*Ibid.* Feb. 6th. 259.

IV. —. (1931). **Undulant Fever and Infected Milk.**—*Lancet.* **221.** 1365. [2 refs.]

V. Huddleson, I. F., & Johnson, H. W. (1931). **Phagocytosis of Brucella, an Index of Immunity to Undulant Fever in Man.**—*Science.* **74.** 315-316.

VI. Tebbutt, A. H., & Marsh, H. T. (1931). **The First Case Report of Indigenous Undulant Fever in New South Wales.**—*Med. J. Austral.* **1.** 170-172. 2 tables. [3 refs.]

VII. Hardy, A. V., Jordan, C. F., & Borts, I. H. (1932). **A Further Study of Brucella Infection in Iowa.**—*Publ. Hlth. Rep. Washington* **47.** 187-193. 3 tables. [2 refs].

The first four references deal with undulant fever occurring in man in the British Isles. Manson-Bahr has reported a case in a man aged 57, resident in England for nine years. The diagnosis was made by the finding of agglutinins for *Br. abortus* in the serum at a dilution of 1 in 2,400. A letter by Dalrymple-Champneys points out that there are four recorded cases of human undulant fever in the British Isles in which an organism of the brucella group has been isolated, twice from the urine and twice from the blood. In addition, there are two other cases which have not been recorded. Wilson replies that he has isolated the bovine type of *Br. abortus* from two further cases, both school-boys, and suggests not only that the serum of patients with a pyrexia of unknown origin should be tested for

agglutinins for the brucella group, but also that a systematic examination of the sera of patients with joint pains may be of value. A short note in the *Lancet* points out the prevalence of brucella infection of cattle in Great Britain and the number of cases of undulant fever in man which are being reported. Reference is made to an outbreak of undulant fever in the U.S.A. [(1931). Hasseltine & Knight, *Publ. Hlth. Rep. Washington.* **46.** 2291.] which was traced to an infected milk supply and which appeared to cease after the milk was pasteurized.

Huddleson and Johnson report in a short note that, as compared with those of non-contacts, leucocytes of individuals who have been in contact with brucella infective materials, or have recovered from undulant fever, have marked phagocytic activity for organisms of the brucella group. [It would appear that, as whole citrated blood is used, the serum constituents may play the important part as in other phagocytic reactions.]

The last two papers deal with undulant fever in Australia and in the U.S.A. respectively. The former is a description of a case occurring in a dairy farmer who was accustomed to handling aborting cattle. The diagnosis was made principally by means of the agglutination test, a positive reaction at 1 in 640 being recorded. The latter paper deals with undulant fever in Iowa where the disease appears to be associated with infection in cattle and in swine, although the transmission of infection from swine to cattle or cattle to swine is unusual, if it occurs at all. Diagnosis was made by blood culture ; the strains isolated were studied and the type correlated with the source of infection. Cattle appeared to be responsible for more than half the cases. Some of the cases of infection with the porcine type occurred in men employed in the swine division of packing plants.

R. LOVELL.

Snyman, P. S. (1931). *Vibrio fœtus* **as a Cause of Bovine Abortion in South Africa.**—*17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa.* Part. 1. pp. 197-203. 1 table, 3 figs. [5 refs.] Pretoria : Govt. Printer.

In a dairy herd of 160 animals, 13 abortions attributed to *Vibrio fœtus* occurred. The sera of the aborting animals were all negative to the routine agglutination tests for *Br. abortus* infection.

No female animals had been introduced into this herd for 20 years and no previous abortions had occurred. In the year before the abortions took place, however, a flock of 200 sheep had been brought to the farm and it is possible that the sheep may have introduced the infection, although there were no abortions in the flock.

A bovine fœtus was examined and spirillae were demonstrated microscopically in the stomach contents. These were cultivated on serum agar slants to which serum broth and defibrinated horse blood had been added.

Growth occurred in tubes sealed with paraffin wax and in tubes incubated in an atmosphere containing a considerable percentage of carbon dioxide ; growth was more abundant in the latter case. The cultural characters were those of *Vibrio fœtus*.

A carbol-saline suspension of the organisms was prepared and used as the antigen in agglutination tests of the sera of the 13 animals which had aborted. Agglutination was obtained in each instance, but in low titre. The reactions varied between incomplete agglutination at 1 : 20, shown by two animals, and incomplete agglutination at 1 : 160, given by one animal only.

The micro-organism was inoculated into a number of laboratory animals and in one instance a pregnant guinea pig aborted three days after the inoculation ; vibrios were recovered from its uterus and from the stomach of the fœtus. In the latter, they were not present in pure culture.

A. D. McEWEN.

CHERRINGTON, V. A., & GILDOW, E. M. (1931). **Bovine Mastitis Caused by *Pseudomonas aeruginosa*.**—*J. Amer. Vet. Med. Ass.* **79.** 803-808. 1 table. [4 refs.]

An outbreak of mastitis was encountered in a herd of 11 animals ; attacks were recurrent and acute, and each heifer developed the condition soon after calving. Seven animals were affected ; *Ps. aeruginosa* (*B. pyocyaneus*) was isolated from four and *E. coli* from one. The two remaining animals were dry at the time of examination. There was no indication that any other organisms were associated in causing mastitis in these cows.

The blood serum of these animals showed an agglutination titre of 1 : 200 to 1 : 1,600 whilst milk serum, which gave a more or less parallel degree of reaction, had a titre of 1 : 50 to 1 : 500. The blood and milk serum of the other animals showed definitely lower titres.

The author believes that the source of recurrent infection was the practice of washing the dairy utensils in the water which went to the drinking-trough.

A. W. STABLEFORTH.

CAMPBELL, J. A., & FILDES, P. (1931). **Tetanus. X. The Effect of the Oxygen Tension of the Tissue Fluids in controlling Infection by *B. tetani*.**—*Brit. J. Exp. Path.* **12.** 77-81. 3 tables. [2 refs.]

Variations in the oxygen tension of the tissues of guinea pigs were produced by controlling the composition of the air breathed by the animals.

By adding carbon monoxide to the inspired air or by reducing the percentage of oxygen, the oxygen tension in the tissues was lowered 70 per cent. Conversely, by increasing the percentage of oxygen in the air, the oxygen tension in the tissues, was raised.

Washed and heated tetanus spore suspension mixed with aleuronate, when inoculated subcutaneously or intramuscularly into guinea pigs, caused tetanus in a higher percentage of animals with a lowered oxygen tension of their tissues than in control animals breathing ordinary air, and animals with a higher oxygenation of their tissues developed tetanus in a fewer percentage of instances when inoculated intramuscularly than did the controls.

It is concluded that the oxygen tension of the tissues controls the germination of the spores.

A. D. McEWEN.

SCHEUBER, J. R. (1931). **Black Quarter and Malignant Oedema : A New Method for the Preparation of a Bi-valent Vaccine against *B. chauvoei* and *Vibrion septique*.**—*17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa.* Part 1. pp. 193-196. 1 table, 1 fig. [5 refs.] Pretoria : Govt. Printer.

Where any doubt exists regarding the identity of the causal micro-organism of black quarter or malignant œdema, a bi-valent vaccine is preferable to a mono-valent one.

A bi-valent *B. chauvoei* and *V. septique* vaccine is made by using a culture medium of one part minced liver boiled with two parts of distilled water and containing 1·0 per cent. peptone, 0·3 per cent. sodium chloride, and 0·2 per cent. sodium phosphate. This medium, in 20 litre flasks, is sterilised at 120° C. for five hours on two consecutive days. After sterilisation, a sterilised concentrated aqueous solution of glucose is added so as to give a final concentration of 1 per cent. glucose.

The medium is then inoculated with *B. chauvoei* and incubated for one week. During this period, as it appears to flag, growth is stimulated by adjusting the reaction to pH 8, and by adding more glucose. At the end of the week the culture is inoculated with *V. septique* and growth maintained for another eight or ten days.

This mixed culture is then formalinised, 0·4 per cent., and incubated for at least one week. After being tested for sterility, its immunising properties are ascertained.

By this means a bi-valent vaccine is obtained which protects against inoculation with *B. chauvoei* and with *V. septique*.

A. D. McEWEN.

Weinberg, M., Davesne, J., & Lefranc, Mireille. (1931). Premières souches de bacillus oedematis Sporogenes (*B. sordellii*) isolées en France. [**The first Strains of** *B. oedematis sporogenes* (*B. sordellii*) **isolated in France.**—*C.R. Soc. Biol. Paris.* **107.** 506-508.

*B. sordellii* has been isolated from the serous fluid and muscle of a sheep affected with gas gangrene in the Rennes district. The same species of bacillus has been recovered in only one out of 283 cases of acute appendicitis.

A brief description is given of the cultural characters and the toxin of the bacillus. It is assumed that the microörganism is uncommon in European soils.

A. D. McEWEN.

## DISEASES CAUSED BY PROTOZOAN PARASITES.

Corson, J. F. (1931). **Experimental Infection of Antelopes (Dik-dik) with** *Trypanosoma rhodesiense*.—*Ann. Trop. Med. Parasitol.* **25.** 211-214. [2 refs.]

Corson, J. F. (1931). **Hyrax as a possible Reservoir of** *Trypanosoma rhodesiense*. —*J. Trop. Med.* **34.** 213-214. [1 ref.]

Corson, J. F. (1931). **Direct Infection of Native Fowls with** *Trypanosoma rhodesiense*.—*Ibid.* 109. [1 ref.]

Corson, J. F. (1931). **The Effect of the Injection of Human Blood Serum into White Rats infected with** *Trypanosoma rhodesiense*.—*Kenya & E. Africa Med. J.* **7.** 292-296. [2 refs.]

Corson, J. F. (1931). **Further Observations on the Trypanocidal Action of Human Blood Serum on** *Trypanosoma rhodesiense* **in White Rats.**—*J. Trop. Med.* **34.** 81-83. [2 refs.]

The first three papers deal with the experimental inoculation of dik-dik, hyrax and fowls with *T. rhodesiense*, and discuss their possible rôle as carriers

of the trypanosome. Dik-dik showed trypanosomes in the blood 9 to 17 days after inoculation, but there was no evidence of infection of the lymphatic glands or spinal cord. In hyrax, the incubation period was usually four days and the animals were in good condition at the end of a month. Trypanosomes were not detected in the blood of inoculated fowls, but, in two out of the five birds inoculated, it was possible to demonstrate infection by the subinoculation of rats.

The last two papers deal with the trypanocidal action of human serum on *T. rhodesiense* in white rats. The sera were obtained from normal human beings and from sleeping sickness patients, the sera of monkeys and antelopes being used for control purposes.

The monkey and antelope sera had no effect. In some cases human sera caused a marked reduction in the number of trypanosomes within 24 hours. Human serum was most active when the trypanosome strain was one which had previously been maintained in sheep or goats. The serum of sleeping sickness patients did not show any less trypanocidal action than that of healthy persons.

U. F. RICHARDSON.

DUKE, H. L. (1931). *Trypanosoma gambiense* **in Monkeys and Ruminants; prolonged Infection, Immunity and Super-Infection.**—*Parasitology*. **23.** 325-345. [7 refs.]

The author records variations in the transmissibility of strains of *T. gambiense* in *G. palpalis*. The transmissibility index is calculated from the formula $T = \frac{S}{p} \times \frac{n \times 100}{N}$; where N = the total number of flies dissected, n = the total number of flies containing flagellates, p = the number of infected flies 25 days old or older and S = the number of these mature flies which show gland infection. The transmissibility diminishes with the length of the sojourn of the trypanosome in its mammalian host, but a reduced power may be retained for a long time even till the death of the host. The transmissibility of a strain may be regained on inoculation into a new host.

In super-infection experiments there was some evidence of immunity of the host shown by the rapid loss of transmissibility of the super-infecting strain.

U. F. RICHARDSON.

HORNBY, H. E., & BAILEY, H. W. (1931). **Diurnal Variations in the Concentration of** *Trypanosoma congolense* **in the Blood-Vessels of the Ox's Ear.**—*Trans. Roy. Soc. Trop. Med. Hyg. Lond.* **24.** 557-564. [3 refs.]

By warming the ear of an ox, a reduction of trypanosomes from 52 to 7 per 100 fields was effected, whilst the concentration remained practically constant over the same period in the untreated ear. The greatest concentration of trypanosomes in the ear veins is found in the early morning; as the day progresses they decrease on account of the effect of warmth and the dilatations of the ear capillaries with an increased blood supply.

It was found that tartar emetic, like halarsine and antimosan, will cause an increased concentration of trypanosomes in the ear veins, in the case of tartar emetic this concentration occurring early (five minutes). The authors consider that the explanation of this phenomenon is that the drugs cause the trypanosomes to lose their hold in the capillaries so that they are swept into the general circulation.

U. F. RICHARDSON.

Shortt, H. E., & Swaminath, C. S. (1931). **Life-History and Morphology of *Trypanosoma phlebotomi* (Mackie, 1914).**—*Ind. J. Med. Res.* **19.** 541-563. [8 refs.]

Thomson, J. G. (1931). ***Trypanosoma tragelaphi* (Kinghorn, Yorke and Lloyd, 1913) from the Blood of the Humped Zebu (*Bos indicus*) in Nigeria.**—*Trans, Roy. Soc. Trop. Med. Hyg. Lond.* **25.** 5-6.

The first paper describes the morphology and life history of a trypanosome of the gecko, *Hemidactylus frenatus*, the insect host being a sandfly *Phlebotomus babu*. The stages in the two hosts have previously been described as *Crithidia phlebotomi* and *Trypanosoma hemidactyli*. Extra-cellular cystic forms are described in the coagulated blood meal in the midgut of the phlebotomus.

The second paper differentiates *T. tragelaphi* from *T. theileri* by its banded nucleus, and from *T. ingens* by its smaller size and vacuolated cytoplasm, without the appearance of striation characteristic of *T. ingens*.

U. F. RICHARDSON.

Wallace, J. M., & Wormall, A. (1931). **Red-Cell Adhesion in Trypanosomiasis of Man and other Animals. II. Some Experiments on the Mechanism of the Reaction.**—*Parasitology*. **23.** 346-359. 6 tables. [14 refs.]

The authors have carried out further investigations on the red cell adhesion phenomenon described by Duke and Wallace [(1930) *Parasitology*. **22.** 414.]. It was found that washed trypanosomes gave no adhesion when filtered " adhesin " sera were used unless fresh normal human or guinea pig plasma was added. The factor added by the fresh serum appeared to be similar to hæmolytic complement as it could be removed by filtering, heating or by the addition of ammonia.

The " adhesin " sera were obtained from monkeys infected by *T. gambiense* or *T. rhodesiense* which had previously been treated with Bayer 205. Other sera were obtained from human sleeping sickness patients and from untreated monkeys suffering from a chronic trypanosome infection. When kept on ice the sera retained the " adhesin " property for several months. The trypanosomes were obtained from monkeys or guinea pigs and after washing were suspended in citrate-Ringer-glucose solution. The red cells of a primate were necessary for the reaction.

It was shown that the " adhesin " property of the sera was not destroyed by the absorption of normal agglutinins or isohæmagglutinins.

U. F. RICHARDSON.

Belitzer, A., & Markoff, A. (1930). L'agent vecteur de la piroplasmose canine dans les régions centrales de l'U.R.S.S. (Russie). [**The Carrier of Canine Piroplasmosis in the Central Area of the U.S.S.R.**].—*Ann. de Parasitol.* **8.** 598-601. [14 refs.]

The authors describe the infection of two bitches by adult *Dermacentor reticulatus* bred from ticks which had fed as adults on a case of canine piroplasmosis at Omsk. The larvae and nymphs reared from the infected ticks were fed on white mice. Nine larvae attached themselves on a dog, but did not transmit piroplasmosis ; the nymphs would not feed on dogs, but the adults fed readily.

The authors consider that *Rhipicephalus sanguineus* and *Ixodes ricinus* may also be implicated in the transmission of canine piroplasmosis in South Russia.

U. F. RICHARDSON.

SCHLOTTHAUER, C. E., & ESSEX, H. E. (1931). **Control of Enterohepatitis in Turkeys.**—*Cornell Vet.* **21.** 252-255. [1 ref.]

Despite the opinions of SMITH and of TYZZER, the authors consider it very probable that blackhead is transmitted by eggs. They describe their observations made during 1929 and 1930 on about 800 turkeys hatched and reared under varying experimental conditions. A number of them died of blackhead when five to seven days old ; the experiments indicated that the mortality was reduced by keeping the poults in battery brooders for the first two or more weeks before removing them to fresh ground. This prevented the spread of early infection and avoided contamination of the ground. They therefore recommend that this principle be combined with the control methods suggested by BILLINGS.

NORMAN HOLE.

I. RODHAIN, J. (1931). Deux *Leucocytozoon* d'Oiseaux du Congo belge. **[Two Leucocytozoa of Birds in the Belgian Congo]**.—*C.R. Soc. Biol. Paris.* **107.** 273-276. 7 figs. [3 refs.]

II. O'ROKE, E. C. (1930). **The Incidence, Pathogenicity and Transmission of *Leucocytozoon anatis* of Ducks.**—*J. Parasitol.* **17.** 112.

I. The author gives a morphological description of two leucocytozoa he has encountered in the Belgian Congo. One, for which he suggests the name *Leucocytozoon monardi*, he found in the sparrow, *Passer griseus*. The adult parasite, as seen in the blood, was about 12 $\mu$ in diameter with an excentric nucleus, but no visible karyosome. It seemed identical with the one described by MINE in the sparrow, *P. montanus*, in Japan and with the one described by EMAYER in *P. domesticus* in Mauritius. The author's sparrow was apparently clinically unaffected by the parasite which, according to MINE, can cause death. The other parasite which he found in the snake-bird, *Plotus rufus*, was larger than that of the sparrow, reaching a diameter of 16 $\mu$ ; sometimes as many as three of these parasites could be seen in one host cell. The nucleus possessed a karyosome. The author suggests that this parasite should be named *Leucocytozoon vandenbrandeni*. Young forms could be seen in the blood in both cases, but no evidence of schizogony was observed.

II. This is an abstract of a paper presented at the sixth annual meeting of the American Society of Parasitologists. *Leucocytozoon anatis* is not pathogenic for adult ducks, but causes a 35 per cent. mortality in ducklings. It is apparently a common parasite on Douglas Lake and seems to be transmitted by the blood-sucking insect *Simulium venustum*. The author carried out investigations on domestic Pekings, Indian runners, wild mallards and wild black ducks ; some ducklings were exposed to all the insects on the lake, some to *S. venustum* alone, while others were not exposed at all, and in this way the author proved the rôle played by *S. venustum*.

NORMAN HOLE.

SCHWETZ, J. (1931). Sur quelques hématozoaires des oiseaux de Stanleyville (Congo belge). **[Some Hæmatozoa of Birds at Stanleyville (Belgian Congo)]**.—*Ann. de Parasitol.* **9.** 311-322. 1 table, 4 figs. [7 refs.]

During 1927-1929, the blood of 143 birds of 18 different species was examined for parasites. Parasites were found in 67 of them, comprising 11 different species.

The following is a list of the various parasites found in the birds, some of which harboured more than one type of parasite :—

1. Hæmoproteus and leucocytozoon in two out of five guinea fowls (*Numida* sp.).
2. Microfilaria, leucocytozoon, trypanosomes and (?) hæmoproteus or plasmodium in six out of 14 pheasants (*Corythacola cristala*).
3. Hæmoproteus, leucocytozoon, trypanosomes and *Plasmodium fallax* in all of four owls (*Syrnium nuchale*).
4. Leucocytozoon and hæmoproteus in 7 out of 12 yellow weavers (*Hyphantornis cuculatus*).
5. Hæmoproteus in 3 out of 14 wild ducks (*Anas* sp.).
6. Leucocytozoon in one sparrow-hawk.
7. Leucocytozoon in one *Centropus senegalensis*.
8. Leucocytozoon and hæmoproteus in all of seven sparrows of three different types (*Brachycope anomala*, *Piconotus tricolor*, *Amaurestes fringilloides*).
9. Trypanosomes, microfilaria, leucocytozoon and hæmoproteus in all of 36 hornbills (*Bycanistes Sharpei duboisi*).

The blood films of five eagles, four crows, four turacos, six green pigeons, six turtle doves, twelve sparrows (*Passer* sp.) and ten swallows were free from parasites.

R. LOVELL.

## DISEASES CAUSED BY FILTRABLE VIRUSES.

Claverie, J. (1931). La lutte contre la peste bovine en Guinée française. **[The Rinderpest Control Measures adopted in French Guinea].**—*Rec. Méd. vét. exotique.* **4.** 121-128. 1 diagram.

The measures adopted are claimed to have prevented any spread of rinderpest into the interior of the territory since 1924, although border outbreaks occur from time to time. In the event of an outbreak, the movement of ruminants, hides and meat is prohibited ; infected herds are isolated and any infected animals are slaughtered and buried intact to avoid the danger of spread due to infected hides and meat. The author believes that spread by this means is common and mentions that the natives say that to introduce infected meat is a well known method of infecting an enemy's herd. Cattle which have been in contact with infected animals are dealt with by " pestisation " which consists of rubbing the muffle lightly with virulent nasal discharge. This shortens the period over which the herd must be watched but allows the survival of resistant animals which may later produce resistant descendants. The native owners would oppose the slaughter of healthy in-contacts, but do not object to slaughter when the disease is apparent.

Anti-rinderpest serum is not used for these small border outbreaks as it would entail delay and the employment of a larger veterinary staff.

U. F. RICHARDSON.

I. Wagener, K. (1931). **Investigations on the Pathogenicity of Vesicular Stomatitis Virus.**—*Cornell Vet.* **21.** 344-359. [23 refs.]

II. Wagener, K. (1931). **Infection and Immunity of Vesicular Stomatitis in Guinea Pigs.**—*Vet. Med.* **26.** 388-396. 1 table, 2 figs. [17 refs.]

In the first of these two papers, the author discusses the pathogenicity of the virus of vesicular stomatitis as compared with that of foot and mouth disease for ten different species of animals and, in the second, he deals with the immunity conferred on guinea pigs by the introduction of the former virus by different routes.

No material difference was observed in the infection of vesicular stomatitis and foot and mouth disease in the case of swine (seven used). Chickens and pigeons (five and twelve used respectively) were found to be insusceptible and, out of twenty-two rabbits, only one developed a lesion and that was small. Cats (five used) were susceptible only in a minor degree ; in white mice (eighteen used), the virus persisted at the site of inoculation without producing specific lesions and could be transmitted from mouse to mouse in this condition. Generalisation did not take place in white or wild rats although they proved highly susceptible. The transmission results were not uniform and it is concluded that this was due both to the virulence of the virus and to the susceptibility of the animal. Although the author's experiments confirm those of COTTON and MOHLER in that transfer of the disease to cattle by contact was not possible, this method of transmission was successfully carried out in small pigs.

In the second paper, the author discusses the differences between the virus of vesicular stomatitis and foot and mouth disease ; these are explained on the basis of the relatively lower virulence of the former as compared with the latter. Two strains of virus (vesicular stomatitis) were used—Indiana and New Jersey —and infection was induced by thirteen different routes. It is stated that " . . it was surprising that in contrast to the small possibility of infection in vesicular stomatitis the possibilities of immunisation are evidently large compared with the results in foot-and-mouth disease."

The author concludes from these experiments that the infective stages of the vesicles in vesicular stomatitis of guinea pigs may persist for as long as eleven days.

G. W. DUNKIN.

KASAI, H. (1931). **Studies on the Etiological Relationship between Smallpox and Sheep Pox, and Prophylactic Vaccination against Sheep Pox. Part 1. On the Transformation of Sheep Pox Virus into Vaccinia.**—*Jap. J. Exp. Med.* **9.** 281-299. 13 tables. [11 refs.]

**Part 2. On the Ovinised Vaccine.**—*Ibid.* 299-315. 7 tables. [9 refs.]

**Part 3. An Additional Study on Caprina.**—*Ibid.* 315-332. 6 tables. [6 refs.] [In English.]

After reviewing the literature on the possibility of converting sheep pox virus into vaccinia by passage through different species of animals, the author gives a description of his own investigations. Two strains of sheep pox obtained from Manchuria and Algeria respectively and a vaccine virus from Tokio were utilised. Sheep pox virus was first adapted to the rabbit by passage through the testicle for three to five generations. In the first transference a variety of bacteria was found in the inoculated testicle, but later an uncontaminated virus was obtained. The third and subsequent testicular generations gave rise to cutaneous pustules of a vaccinal type in several calves. Passage of the virus through the testicle of the sheep also resulted in a gradual adaption of the strain to this animal. These calves as well as the rabbits were subsequently tested with vaccine virus with totally negative results ; in addition, ten children inoculated

cutaneously with this sheep-rabbit-calf strain presented lesions indistinguishable from vaccine pustules.

The calf strain was passed back to the sheep and produced an eruption of a vaccinal type : tested later with sheep pox virus, these animals showed scattered lesions accompanied by some systemic disturbances.

As a result of these experiments, the author claims that a transformation of sheep pox into cow pox had occurred. The strain thus obtained was non-pathogenic to the sheep and was immunologically different from sheep pox. [The occurrence of spontaneous vaccinia in the rabbit has been reported by several investigators. There is no indication in this article that adequate precautions were taken to avoid an error of this nature.]

In part 2, the value of vaccine virus as a prophylactic agent against sheep pox was studied. The author noted that vaccine virus produced a definite vesicular eruption in the sheep up to the eighth generation ; from the ninth to the fifteenth generations, the virulence became distinctly impaired since the lesions were restricted to a slight œdematous, subcutaneous swelling ; from the fifteenth to the twenty-third generations, vesicular eruptions again occurred. This " ovinised " strain became avirulent for the calf and also lost the greater part of its virulence for the rabbit.

A series of sheep was immunised by means of this strain and then subjected to cross-immunity experiments. It was found that they were definitely immune to the homologous strain, but were partially susceptible to the original vaccine virus ; inoculated with sheep pox, they presented a certain degree of immunity. Sheep immunised against sheep pox were also immune to this " ovinised " cow pox but were susceptible to vaccinia.

In the final section, the author considers the value of " caprina " or sheep pox virus modified by successive passage through the goat. He states that the virus is more easily stabilised by cutaneous injection than by the subcutaneous method originally suggested by Konew. A sheep pox strain was carried through a series of 15 goats and became " fixed " between the tenth and fifteenth generations, i.e. the lesions were strictly localised to the point of inoculation. Goats which had recovered from this strain subsequently resisted " caprina " and " ovinised " virus, but were susceptible to vaccinia. Seventeen sheep immunised with " caprina " were also tested with sheep pox : in eight cases no reaction resulted, but local or generalised lesions were noted in nine. It is the considered opinion of the author that " caprina " possesses a definite value as a prophylactic agent against sheep pox.

R. E. GLOVER.

Muckenfuss, R. S., McCordock, H. A., & Harter, J. S. (1932). **A Study of Vaccine Virus Pneumonia in Rabbits.**—*Amer. J. Path.* **8.** 63-71. 8 figs. on 4 plates. [9 refs.]

Vaccine virus was capable of causing a characteristic pneumonia when introduced into the lungs of rabbits although this property was not common to all strains of virus. The alveoli first contained coagulated albuminous fluid and showed fibrosis and, later, a cellular exudate composed principally of large mononuclear cells. Necrosis of the exudate and of the alveolar walls led to hæmorrhage and to the appearance of polymorphonuclear leucocytes. The perivascular lymphatics were distended with coagulated fluid. The walls of many of the larger blood vessels were œdematous and often showed a diffuse infiltration

of all the coats with polymorphonuclear leucocytes. Guarnieri bodies were demonstrated in the epithelial cells of the bronchi of four animals. Vaccine virus pneumonia was unlike the ordinary bacterial pneumonia commonly seen in rabbits.

J. R. M. INNES.

RIVERS, T. M. (1931). **Cultivation of Vaccine Virus for Jennerian Prophylaxis in Man.**—*J. Exp. Med.* **54.** 453-461. 1 text fig., 3 plates. [7 refs.]

The author has previously described a simple method for the cultivation of neurovaccine virus in a medium containing minced chick embryo tissue in Tyrode solution. Since it was deemed undesirable to use these cultures for the vaccination of man, further experiments were undertaken with a view to adapting a dermal strain to growth in tissue cultures.

A glycerinated sample of vaccinia was freed from bacteria by a modified testicular method. The virus was first passed through rabbit testicles: after the second passage, the blood was collected on the fourth day after inoculation and introduced into the testicle of a third rabbit. The bacteria-free seed material thus obtained was added to minced chick embryo in Tyrode solution in suitable amounts, and the mixtures were incubated for five days in collar flasks previously designed for this work. The author was able to carry the virus through an uninterrupted series of fifteen culture generations. These cultures, mixed with 50 per cent. glycerine, remained potent at + 2·5° C. for at least one month.

The inoculation of these cultures into rabbits and monkeys, as well as into man, produced lesions which were typical of a vaccinal eruption; in addition, cross-immunity experiments in rabbits showed that recovered animals were refractory to infection with a vaccine virus harvested from calves.

This method is recommended by the author as the least likely to lead to contamination by an extraneous virus which might be injurious to man.

R. E. GLOVER.

CAHILL, E. A. (1931). **Obscure Factors Affecting Hog Cholera Vaccination.**—*North Amer. Vet.* **12.** No. 8. 35-40.

The author deals with the various factors which influence the serum-virus method of immunisation against hog cholera (swine fever).

T. M. DOYLE.

STUART, G., & KRIKORIAN, K. S. (1931). **Further Studies in Anti-Rabies Immunisation. Rabies Virus—Exalted and Classical Strains Compared.**—*J. Hyg. Camb.* **31.** 523-542. 4 tables. [40 refs.]

The occurrence in Palestine of a street virus of extraordinary virulence, which, despite treatment, caused the death of three persons, afforded the authors an opportunity of studying the question of the plurality of viruses. This strain, which they have termed the Safad virus, has been compared with a "fixed" Paris strain and a street virus from Jaffa in respect of (1) infectivity; (2) time of incubation and duration of illness, and (3) the occurrence of Negri bodies. The M.L.D., i.e. the highest dilution which in a series of rabbits of average weight produced symptoms in the same period of time after subdural inoculation with 0·2 c.c., proved to be a 1 : 1,000 dilution of each virus under test. The Safad virus as originally obtained caused illness in seven days and death in eight days, but

after serial passage through the rabbit these periods were reduced to five and seven days respectively. The corresponding periods for the other strains were five and seven days for the " fixed " virus and sixteen and twenty days for the street virus. Negri bodies were present in the human brain from which the strain was derived, but were absent from the rabbit brains. The Safad virus is regarded, therefore, as an exalted virus which was " fixed " from the first rabbit transfer.

This strain at its twentieth subpassage was compared with the Paris " fixed " virus by cross-immunity experiments. Twenty rabbits, whose sera had been proved free from rabicidal properties, were divided into two equal batches. Each rabbit in the first series was treated for fourteen days with 5·0 c.c. daily of a 2 per cent. suspension of killed carbolised Paris virus, and the remainder received an identical dosage of Safad virus. The immunity was tested in each rabbit 52 days after completion of treatment, after which cross-immunity experiments were carried out by the inoculation of five rabbits out of each series with Paris " fixed " virus and the remainder with the Safad virus. These experiments showed that Paris " fixed " virus afforded 100 per cent. protection against the homologous strain and 60 per cent. against the atypical strain : the Safad virus afforded 40 per cent. protection against the homologous strain and 20 per cent. against the Paris strain. Similarly, it was noted that the serum from rabbits immunised against the Paris strain neutralised six volumes of the homologous strain and four volumes of the heterologous strain in equal dilution, while the Safad immune serum tested under identical conditions neutralised two volumes of the homologous strain and one volume of the Paris virus. It is concluded that, despite the apparent differences arising from these experiments, the Paris and Safad strains can be safely included within the same category of rabies virus.

R. E. GLOVER.

I. Cunningham, J. R. (1932). **A Distemper-Like Disease of the Fox.**—*Vet. Rec.* **12.** 141-144. [3 refs.]

II. Dalling, T. (1932). **Distemper in the Fox.**—*Ibid.* 141. [2 refs.]

These two papers, the one (I) being a series of clinical observations and the other (II) a short experimental investigation, suggest that the silver fox must be added to the list of animals which are susceptible to the virus of dog distemper.

On certain ranches in Prince Edward Island (I) a distemper-like disease was encountered and was kept under control by the liberal use of anti-canine distemper serum (Lederle) given at ten-day intervals.

An attempt was made (II) to protect silver foxes bred in Scotland against dog distemper by administering dog vaccine or serum (six " protected " and two controls). All the treated foxes remained well after the administration of living virus, whereas, of the controls, one died on the 11th day and the other refused food on the 10th day, but was otherwise unaffected. The author concludes that the silver fox is susceptible to dog distemper and that successful immunization can be carried out.

In Prince Edward Island (I) a vaccine was prepared from fox tissue (spleen and brain) and was used successfully in doses of 5 c.c. on 2,000 foxes.

Summarising the results, the author (I) states that in 10 ranches (740 foxes) the results obtained were good ; in 17 ranches (560 foxes) there were no losses, but distemper had at no time been encountered : the total losses after vaccination

ranged from 2 per cent. to 20 per cent. It is concluded that silver foxes can be immunised against the disease by vaccine prepared according to the method of LAIDLAW and DUNKIN and that serum prepared from recovered foxes has curative properties.

G. W. DUNKIN.

GREEN, R. G. (1931). **Epizootic Encephalitis of Foxes. II. General Consideration of Fur Range Epizootics.**—*Amer. J. Hyg.* **13.** 201-223. 11 tables. 7 figs.

Epizootic encephalitis may occur as an enzootic in foxes kept in pens, but it becomes an epizootic under fur range conditions. The author discusses his experiences in 1927 with an epizootic on a large fur range. Out of nearly 7,000 foxes over 17 per cent. were lost. The disease appeared four to six days after exposure to infection and reached a peak of mortality in two to three weeks. After that time, the losses decreased. When the infection was at its height, the disease was very acute, but later cases showed a loss of condition suggesting that secondary complications were involved.

The spread of the disease was assisted by the range conditions and by the carnivorous and cannibalistic tendencies of the fox. Foxes under ten months of age were most susceptible, but the virus appeared to vary in virulence. The author mentions the successful use of an attenuated virus-vaccine.

NORMAN HOLE.

I. BEACH, J. R. (1931). **A Bacteriological Study of Infectious Laryngotracheitis of Chickens.**—*J. Exp. Med.* **54.** 801-808. 1 table. [8 refs.]

II. BEACH, J. R. (1931). **A Filtrable Virus, the Cause of Infectious Laryngotracheitis of Chickens.**—*Ibid.* 809-816. 3 tables. [6 refs.]

I. The author made a bacteriological study of fowls affected with infectious laryngotracheitis and found no evidence that the causal agent was a visible bacterium. Furthermore, he showed that the causal agent was present in bacteriologically sterile tracheal exudate and in the spleens and livers of affected fowls.

In Beach's experience, ducks, pigeons, doves, crows, starlings, sparrows and also guinea pigs and rabbits are refractory to infection. According to KERNOHAN, sparrows and pigeons are susceptible to natural infection.

II. In filtration experiments with tracheal exudate, the filtrate was infective in eight tests made with Berkefeld V filters and in two out of six tests with Berkefeld N filters; six tests with Seitz filters yielded negative results. It was shown that the sera of fowls which had recovered from infection with a New Jersey strain of virus neutralised the homologous strain and also a Californian strain.

Dried virus was proved to be viable after storage for five months.

T. M. DOYLE.

COOPER, H. (1931). **Ranikhet Disease: A New Disease of Fowls in India due to a Filter-passing Virus.**—*Ind. J. Vet. Sci. & Anim. Husb.* **1.** 107-123. 7 tables, 10 charts. [9 refs.]

The author proved by cross-immunity tests that Ranikhet disease was immunologically indistinguishable from Newcastle disease (England), avian pseudo-pest (Java) and avian pest (Philippine Islands).

The disease reported by Cooper was similar in all its principal features to that described by investigators in the other parts of the world where it has occurred. It is an acute and highly infectious disease of fowls characterised by respiratory distress and a high mortality.

Cooper found that the serum of recovered fowls protected against infection, but that serum prepared by hyperimmunisation of donkeys conferred no protection.

A vaccine, prepared on similar lines to that recommended by KELSER against cattle plague, proved to be valueless.

[Newcastle disease has also been reported from Madras and Ceylon, and from Victoria, Australia—see *J. Dept. Agric., S. Austral.* (1931). **34.** 6. OCHI and HASHIMOTO have reported an outbreak of disease in fowls in Korea which was said to be fowl plague, but from the description given of the symptoms and the fact that pigeons were susceptible to infection (pigeons are strongly resistant to infection with fowl plague virus) it appears more probable the outbreak was caused by Newcastle virus.

There is considerable confusion in the nomenclature which, on account of the wide distribution and economic importance of this disease, should be eliminated. The term " Newcastle disease " which was given provisionally when it was first recognised to be a distinct entity is obviously unsuitable, yet it would appear advisable to retain it until such time as a more appropriate one is coined. The disease should not be so named as to create confusion with an existing disease, therefore the only suggested alternatives " pseudo-plague " or " avian pseudo-pest " should be avoided.]

T. M. DOYLE.

I. STAFSETH, H. J. (1931). **Pigeon-Pox in Michigan.**—*J. Amer. Vet. Med. Ass.* **79.** 822.

II. DANKS, W. B. C. (1931). **Observations on Vaccination of young Chicks one to eight Days old against Fowl-Pox.**—*Ann. Rep. Dept. Agric. Kenya for 1930.* pp. 140-146. 4 tables.

I. Stafseth describes an outbreak of pigeon pox in Michigan. The lesions occurred principally on the feet and legs and near the base of the beak ; a few birds showed lesions in the mouth. The author is opposed to the killing of affected birds and recommends vaccinating them, but gives no information about the vaccine to be employed.

II. Danks reports the vaccination of chicks, aged from one to eight days, by the cutaneous inoculation of live fowl pox virus. Immunity was established by the fifteenth day.

The vaccination occasionally caused generalisation of infection and considerable mortality, and chicks which survived were liable to be stunted in growth.

In the hands of the author, a 2 per cent. suspension of pigeon pox virus in liquid paraffin conferred little if any protection against a subsequent test with fowl pox virus.

[In Great Britain, pigeon pox virus is used extensively for the protection of fowls against natural infection with fowl pox and the method is highly reported on by farmers].

T. M. DOYLE.

ZINSSER, Hans, & CASTANEDA, M. Ruiz. (1931). **A Note on Improvement in the Method of Vaccine Production with Rickettsiae of Mexican Typhus Fever.**—*J. Immunol.* **21.** 403-407. [3 refs.]

The authors have previously recorded successful preliminary experiments on the immunisation of guinea pigs with formolised vaccine [see this *Bulletin*. **1.** 135 & 295.]. With monkeys they have not obtained such clear-cut results, owing to the fact that one non-vaccinated control monkey failed to react to a massive test injection of European virus. They consider, however, that their guinea pig results justify an explanation of their method of vaccine production in order that research may be carried out on the practical value of the method for man. They mention the method of WEIGE, whose work on the production of a vaccine from triturated intestinal canals of infected lice they had previously overlooked ; they give a detailed account of their method of vaccine production and point out that it has the advantage of simplicity. They use male white rats of 125 to 150 g. weight and obtain the rickettsia suspensions by the intraperitoneal injection of infective guinea pig *tunica vaginalis* three days after a subcutaneous injection of 2·5 c.c. benzol and olive oil in equal parts. The peritoneal cavity of each rat is washed out with 15 c.c. of 0·2 per cent. formalin in saline solution and the *tunica vaginalis* is similarly extracted with 5 c.c. of solution. The present difficulty is standardisation, smear preparations examined for rickettsiae being the only available method. Judgment is necessary in choosing the optimum moment of infection to kill the animals.

The authors consider that this work should only be carried out by a person who has passed through an attack of typhus within two years.

NORMAN HOLE.

ALEXANDER, R. A. (1931). **Heartwater. The Present State of our Knowledge of the Disease.**—*17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa.* Part I. pp. 89-150. 10 tables. [67 refs.] Pretoria : Govt. Printer.

In this interesting survey of the disease heartwater, the author has drawn his information from published reports, from unpublished records of experimental work carried out by different workers at Onderstepoort and also from the results of his own researches.

The disease was first referred to in 1877 as occurring in sheep in the S. E. coastal area of the Cape Colony. It has since been reported from S. W. Africa, Angola, French West Africa, the Belgian Congo, from Kenya and Tanganyika territories. The distribution of the disease in the Union of South Africa is not definite, but the infected or potentially infected areas are those suitable for the development of the vector, namely, ticks of the genus *Amblyomma*, and these areas include the south and south-eastern parts of the Cape Colony exclusive of the Karroo, Natal, Zululand and the eastern and north-eastern parts of the Transvaal.

Sheep, goats and cattle are susceptible. The Persian sheep and Afrikander breeds possess a natural resistance to the disease. The virus appears to be specific for ovines, caprines and bovines, other species of animals not being susceptible.

In 1900, it was definitely established that *Amblyomma hebraeum* transmitted the disease, although before this date it was known that the disease could be transmitted by the parenteral inoculation of the blood of an infected animal. The disease was generally regarded as being caused by an ultravisible virus until

1926, when COWDRY demonstrated the relationship between it and the presence of rickettsia in the tissues of infected animals and of infected ticks. The relationship between the ultravisible infective virus in the circulatory blood and the rickettsia has still to be cleared up.

In sheep and goats the disease is easily transmitted to susceptible animals by the intravenous inoculation of fresh virulent blood ; infection of cattle by the same means does not occur so easily. The intravenous injection of virulent blood cannot be relied upon to set up the disease in all cases even with sheep and goats. The reason for cases of failure is not known, but it is apparently not connected with the susceptibility of the animals as these may succumb to a further inoculation. Intravenous inoculation is the most certain manner of transmitting the disease though transmission may be accomplished by subcutaneous and exceptionally by intraperitoneal inoculations. No data are available for intra-cerebral or sub-dural injections.

Virus is not present in the blood during the incubation period though it may be demonstrated 24 hours before the initial rise of temperature. It disappears from the blood on an average of 17 days after the return of the temperature to normal.

The disappearance of virus from the circulating blood corresponds with the disappearance of rickettsia from the tissues. Virus in the blood rapidly perishes and does not generally survive storage for 24 hours. Various attempts at methods of preservation are recorded. It is concluded that virus is not present in the serum or the plasma obtained by prolonged centrifuging of defibrinated or citrated blood. It appears to be attached to the erythrocytes or leucocytes and is found in organs with a rich blood supply, e.g. liver, kidney or spleen.

Filtration experiments have so far failed to demonstrate the virus as being capable of passing the pores of a Berkefeld N or Seitz filter.

No methods of attenuating the virus have been devised ; it is either fully active or completely inactive.

In 1901, LOUNSBURY showed that *Amblyomma hebraeum* transmitted the infection, either as nymphae or as adults provided that in a former stage these had fed on an infected animal. He also showed that, if the larval stage had fed on an infected animal, the adult could transmit the disease, the nymphal stage not having cleansed itself of infection. These and other matters concerning the transmission of ticks have been confirmed and extended.

The bionomics of *A. hebraeum* are discussed.

The intravenous inoculation of emulsified infected fed *A. hebraeum* nymphae produced the disease. The feeding of the nymphae is apparently necessary in order to activate the virus so that the disease can be transmitted by inoculating an emulsion of infected larvae.

A considerable volume of work in connection with the virus in the tick remains to be done and this is regarded as important because virus in blood is extremely fragile and the only likely reservoir for storage of virus for experimental and immunological work seems to be in the infected tick.

There appear to be an indefinite number of strains of the virus. An attack of the disease is necessary to produce any immunity and after two separate attacks a more solid immunity is established. An animal which has recovered from infection with one virus possesses a low degree of immunity to a heterologous virus, but repeated infection with different viruses builds up immunity against all strains.

Attempts have been made to immunise animals by the following methods :—

(a) The inoculation of bile in a manner analogous to that used for immunising cattle against rinderpest. (b) The serum-virus method, but serum from immune

animals was found to have no effect upon the course of an infection. (c) Modified or attenuated blood virus methods, the virus having been subjected to mechanical, chemical or thermal influences. (d) Attempts at the repeated injection of sublethal doses of virus. (e) Repeated subcutaneous injection of virus. (f) Formalinised tissue virus, e.g. formalinised spleen, liver, or brain tissue obtained from sheep at the height of the reaction. (g) Formalinised tick virus obtained by grinding up infective fed larvae in isotonic salt solution containing 1·6 per cent. phenol and 0·4 per cent. formalin ; after further dilution with saline and after storage, this was inoculated into sheep.

None of these methods was successful. In the absence of a reaction there was no immunity and, in the event of a reaction occurring owing to survival of the virus, none of the methods offered a means of controlling the reaction.

The symptoms, morbidity, mortality, *post-mortem* appearances, histopathological diagnosis, differential diagnosis, epizootiology, treatment and prophylaxis, are also dealt with.

It may be noted that in the laboratory a diagnosis is established by the demonstration of rickettsia in sections of tissue from affected animals, but that Jackson, 1931, has described a rapid method of demonstrating rickettsia from fresh *post-mortem* material in smears made from the intima of the larger blood vessels.

Experimental details are given in an appendix.

A. D. McEwen.

Coles, J. D. W. A. (1931). **A Rickettsia-like Organism in the Conjunctiva of Sheep.**—*17th Rep. Direct Vet. Ser. & Anim. Indust., Union of S. Africa.* Part 1. pp. 175-186. 9 figs. [7 refs.] Pretoria : Govt. Printer.

Smears made from the epithelium of the inner surface of the eyelids of sheep suffering from specific ophthalmia or acute conjunctivitis show minute intracellular or extracellular micro-organisms occurring in masses composed of upwards of several hundred individuals. These micro-organisms are pleomorphic showing coccal, rod-shaped and imperfect ring forms, and averaging 0·8 to 1·0 $\mu$ by 0·5 to 0·8 $\mu$ in size.

Stained by Giemsa's stain, the more solid rod-shaped or coccal forms are coloured a reddish purple or blue. The larger imperfect ring forms show a red coloured chromatoid material around the periphery, the remainder of the organism staining a pale blue.

The organism may be demonstrated by staining with the usual bacterial dyes, but they are gram-negative and are not acid-fast. Supravitally they are stained a light purple with brilliant cresyl-blue. The organism is non-motile. It is considered to be a species of rickettsia and the name *Rickettsia conjunctivae* is proposed for it.

A. D. McEwen.

Ogata, N. (1931). Aetiologie der Tsutsugamushikrankheit : Rickettsia tsutsugamushi]. [**The Etiology of Tsutsugamushi Disease :** *Rickettsia tsutsugamushi*].—*Zlb. Bakt. I. (Orig.).* **122.** 249-253. 2 figs. [14 refs.]

" Tsutsugamushi," or " Kedani disease," is an acute febrile disease which is endemic in certain parts of Japan. It is transmitted by *Trombicula akamushi* (Brumpt) and has a seasonal and geographical distribution. The mortality is about 40 per cent. ; recovered animals become partially immune.

Japanese apes, guinea pigs and rats can be used for experimental inoculation ; the author has also found that testicular inoculation is successful in the rabbit and that no loss of virulence results.

The *Rickettsia*, which is believed to be the cause of the disease, is discoverable by microscopic examination of infected testicles.

Cultures have not been obtained by ordinary methods, but the virus can be obtained in testicle tissue cultures.

A. LESLIE SHEATHER.

Applebaum, M., & MacNeal, W. J. (1931). **The Influence of Pus and Blood on the Action of Bacteriophage.**—*J. Infect. Dis.* **49.** 225-243. 23 tables. [1 ref.]

Stewart, A. D., & Ghosal, S. C. (1931). **The Behaviour of Bacteriophage present in Raw Water in the Process of Sand Filtration.**—*Ind. J. Med. Res.* **19.** 137-143. 3 tables. [8 refs.]

The use of bacteriophage in the treatment of infectious diseases has been followed in some cases by clinical improvement, reduction in the number of infecting bacteria and by the recovery of the patient. In other cases, however, the results have not been good although the bacteriophage used has proved highly effective against cultures of the same bacteria *in vitro*.

In order to find an explanation of this, Applebaum and MacNeal made several experiments. They found that if two series of graded dilutions of pus containing staphylococci, one series with potent bacteriophage added and the other without bacteriophage, were incubated for 24 hours at 32° C., the lower dilutions with bacteriophage showed more turbidity than the higher dilutions of the same series and also more turbidity than the tubes without bacteriophage. This inhibitory effect on antistaphylococcus bacteriophage was also observed with pus heated to 60° C. for 30 minutes, with unheated and heated sterile purulent exudate removed from the pleural cavity of a rabbit, with rabbit serum and human serum and, to a lesser degree, with citrated rabbit blood and washed red blood cells of rabbits. When similar experiments with *B. coli* and anti-*B. coli* bacteriophage were performed, either no inhibitory effect was noticed or else the conditions of the experiments were not suitable for the growth of *B. coli* as, for example, when citrated blood was tested. Considerable variation was noticed among the various strains of staphylococci and anti-staphylococcus bacteriophage tested.

Stewart and Ghosal have studied the rôle of bacteriophage in the filtration of water through slow and rapid sand filters. By making comparative tests on two waters, one with bacteriophage active against *B. coli* and one without bacteriophage, they found that the reduction of the number of bacteria by slow sand filters was independent of the presence of bacteriophage. In a further series of experiments, they studied the effect of settlement and filtration on bacteriophage present in the raw water. The bacteria tested were *B. coli commune*, *B. shigae*, *B. flexner*, *Vibrio cholerae* and *B. typhosus*, as bacteriophage active against one or other of these bacteria had been constantly found in the raw water. Varying dilutions of raw, settled and filtered water were added to tubes of broth inoculated with young cultures of the organisms mentioned. The cultures were incubated at 37° C. and examined for lytic action after 18 hours. In the case of slow sand filtration, settlement of the water had greatly reduced the activity of the bacteriophage and filtration had completely removed it. In the case of rapid sand filtration, settlement reduced the activity of bacteriophage against *B. coli* and *B. shigae* and

filtration reduced it still further. Settlement did not impair the activity of bacteriophage against *B. typhosus* and *B. flexner*, but filtration removed it completely. The authors have concluded that bacteriophage does not play any part in the purification of raw water in sand filters and that the process of sand filtration has a definite destructive action on bacteriophage.

C. McG.

Lipska, I. (1932). Le phénomène d'Hérelle dans le lait. [**D'Herelle's Phenomenon in Milk**].—*Le Lait.* **12.** 88-95. 3 tables. [4 refs.]

By incubating a mixture of 10 c.c. of milk, 100 c.c. of broth and 2 drops of an emulsion of 4 sensitive strains of *B. coli* of human origin at 30° C. for 12 hours, the author obtained 12 races of bacteriophage from 12 animals. The activity of the phage in respect to the 4 strains of *B. coli* was diverse.

From experiments in which 22 coliphages isolated from 35 animals were added to milk and tested on the four strains of *B. coli*, the author concludes that the phages became adapted and that the bactericidal power of fresh milk had no influence on them. They could be trained to act in a medium of 20° S.H.—acidity potential scale—(pH 5·4) and often maintained their activity even at 36° S.H. The possible use of bacteriophage in preventing bacterial growth in cheese is discussed.

A. W. STABLEFORTH.

## DISEASES CAUSED BY METAZOAN PARASITES.

Taylor, E. L. (1931). **The Parasitic Diseases of Poultry.** *Paper presented at 49th Ann. Congr. N. V. M. A. (Gt. Britain).* [*Norwich. Aug. 22nd-28th*]. pp. 1-7. [43 refs.]

Discussion (but not paper) published in *Vet. Rec.* **11.** 1052-1058.

This paper discusses the association of parasitic worms with disease in poultry and is divided into four parts. The first part deals with the records in the literature of disease caused by these parasites. It is shown that, although we have a good working knowledge of many of the parasitic worms of poultry, very little information is to be found on disease causation. What information there is may be considered under three headings :—(1) observations on the presence of worms in sick birds ; (2) observations of worms associated with the presence of lesions at the site of their activities, and (3) observations on the results of pure infestations with various species of helminths carried out under properly controlled conditions.

Evidence falling under the first heading is by far the most frequently encountered and is of least value. The occurrence of some worm infestation in healthy fowls is rather the rule than the exception. Evidence in the second category is more valuable, but is not at all easy to find in the literature. Evidence coming under the third heading is the only kind which can lead to a real knowledge of the possible effects of the majority of helminths upon their hosts, but information of this class is hardly to be found in the literature on worm diseases of poultry.

In the second part of the paper, the author gives examples of two definite worm diseases (syngamiasis and prosthogonimiasis) and of one instance of infestation with a worm of doubtful pathogenicity (infestation with *Ascaridea lineata*), mentioning the various points of interest. The doubtful pathogens are much the more numerous and the beneficial results of the experimental study of disease

production by worms is shown by reference to work of this kind which has been carried out on *A. lineata*.

The third part of the paper deals with the etiology of worm diseases. As these parasites cannot multiply in the body of the host, but must all be picked up from the ground, the environmental conditions are very important. The most important of these are :—overcrowding and the suitability of the environment to the external development of the parasites in their free-living stage, or during parasitic life in an intermediate host ; the susceptibility of the host is also important, the age factor being particularly mentioned.

The fourth part of the paper deals with control. Treatment is thought to be of secondary importance in the control of poultry parasites. The ground forms a reservoir of infective material and the use of even a perfect anthelmintic could only temporarily rid the fowls of their infestation. The repeated treatment of susceptible fowls would be inadvisable on account of interference with egg production. It is thought better to regard the use of anthelmintics as being only a temporary measure, pending the introduction of more lasting measures based upon a knowledge of the biology of the worms and their relationship to disease. Complete eradication of the parasites is thought to be out of the question in many instances, but the eradication of disease by preventing the multiplication of the worms beyond physiological numbers is a different matter and should be less difficult to achieve.

Discussion.

In the course of the discussion which was opened by Professor Matheson, it was suggested that prosthogonimiasis might be present in this country. Species of *Capillaria* were held by two or three contributors to be distinctly pathogenic for young birds and *Heterakis* and *Davainea* were mentioned in association with fowl paralysis. Losses due to parasitic worms in aquatic birds were mentioned as being particularly difficult to control.

In his reply, the author emphasised the point that experimental investigation is required for a proper understanding of the disease-producing possibilities of parasitic worms in poultry.

E. L. TAYLOR.

Schwartz, B., & Alicata, J. E. (1931). **Concerning the Life History of Lungworms of Swine.**—*J. Parasitol.* **18.** 21-27. 8 figs. [10 refs.]

The authors, in replying to an implied criticism by von Schuckman and Zunker that they had suppressed reference to the Hobmaiers' work on *Metastrongylus*, point out that the article referred to was only an abstract and that no suppression was intended.

They describe their own observations which, while confirming the Hobmaiers' results in general, differ somewhat in detail. A considerable variety of earthworms can act as intermediate hosts. Two moults take place in the annelid, resulting in an ensheathed, infective third-stage larva. In the pig, this third stage moults in the mesenteric lymph glands, and becomes a fourth stage larva in the lungs, where the fourth moult (to adult) also takes place. The typical five stages are accordingly present in these worms.

T. W. M. CAMERON.

Chitwood, B. G. (1931). **The Structure of the Esophagus in the Trichuroidea.**—*J. Parasitol.* **17.** 35-42. 1 fig. [12 refs.]

The œsophagus of *Trichocephalus* and *Trichinella* does not differ essentially from the typical nematode œsophagus, as was generally supposed. It consists

of a short anterior portion of typical structure which is connected to the intestine by a long tubular portion (with a triangular lumen) embedded in or lying at the side of the column of large cells—this cell body is likened to a cæcal outgrowth, without lumen, from the intestine. Its function is unknown.

T. W. M. CAMERON.

ACKERT, J. E. (1931). **The Morphology and Life History of the Fowl Nematode** *Ascaridia lineata* **(Schneider).**—*Parasitology*. **23.** 360-379. 25 text figs., 2 plates, 1 table. [30 refs.]

After a careful and detailed description of the parasite, Ackert states that he finds that the eggs develop to the infective stage in 16 days at 30° C. and in ten days at 33° C. Development does not proceed at 10° C. and under, while one month at 0° C. prevents subsequent development. Infection normally follows ingestion of the egg and the larval parasites which hatch penetrate into the duodenal mucosa, occasionally going through the intestinal wall to reach the liver and lungs. Maturity is reached in 50 days and at least three moults occur during the life cycle.

T. W. M. CAMERON.

DYRDOWSKA, M. (1931). Recherches sur le comportement du glycogène dans les œufs d'*Ascaris megalocephala* à l'état normal et dans une atmosphère d'azote. **[On the Behaviour of the Glycogen in the Eggs of** *Ascaris megalocephala* **in the normal Condition and in an Atmosphere of Nitrogen.]**—*C. R. Soc. Biol. Paris*. **108.** 593-596. [5 refs.]

Cultivation of the eggs of *A. megalocephala* under aërobic conditions at a temperature of 24° to 25° C. shows that there is an intimate union between the glycogen of the egg and the mitotic figure. When, however, the eggs were incubated anaërobically in glass tubes, segmentation took place only in about 10 to 15 per cent. of the eggs, and this never passed the two-blastomere stage. It is not as regular as in the normal state and karyokinetic figures are never observed—divisions seems to be amitotic. The eggs, however, retain their vitality and develop when removed to aërobic conditions. The glycogen diminished in quantity under the anaërobic conditions, but as it remained in a diffuse state, it was difficult to estimate how far it had diminished.

T. W. M. CAMERON.

I. READ, N. (1931). Untersuchungen über Askaris-Toxine. **[Studies on Ascaris Toxin].**—*Arch. Schiffs- u. Tropen-hyg*. **35.** 227-237. 5 figs. [3 refs.]

II. FENG, L. C. (1931). **Studies on Tissue Lesions produced by Helminths.**—*Ibid*. 1-10. 4 figs. [11 refs.]

I. The author has repeated the experiments carried out by SAKAGUCHI (1928) on the effect of the feeding and subcutaneous injection into guinea pigs of Ringer's solution in which live ascarids had been kept for several hours. The method which he employed for the preparation of the test fluid was that used by FÜLLEBORN and KILRUTH (1929). The ascarids were washed in a 1 per cent. solution of perchloride of mercury in order to kill the bacteria on the surface and were then kept in Ringer's solution for periods of 16 to 60 hours. Four lots of fluid were prepared in slightly different ways and, before being used, each was passed

through the Berkefeld filter N and tested for sterility. Their antigenic action was also tested on scarified areas of the skin of patients infested with ascaris, and all four were found to produce typical skin reactions, although one gave more constant and more marked reactions than the other three. Only eight guinea pigs were used ; four received amounts varying between 50 and 120 c.c. by feeding, and four received the same amounts subcutaneously over a period of 10 to 17 days. The *post-mortem* examination of the guinea pigs was carried out between 24 hours and 7 days after the last feed or injection.

The results obtained were very inconstant : in some animals there was a marked eosinophilia and in others peculiar " hyaline cells " appeared in the lung and spleen ; degenerative changes in the parenchymatous organs which are regarded as typical of all intoxications were not observed. On this point these results are in marked contrast with those obtained by SAKAGUCHI. Small pneumonic foci with hæmorrhages of varying extent into the lung were, however, observed in every instance. No essential difference was noted in the results of feeding and of subcutaneous injection except that the changes may have been a little more marked in those guinea pigs which received the injections.

The author thinks that the results obtained are much too variable to be ascribed to any toxic substance contained in the test fluid. He points out that spontaneous diseases in laboratory animals are by no means rare and that the pathological changes which were observed by SAKAGUCHI and by himself may have been caused by some slight natural infection which remained unnoticed. The experiments require to be repeated using a larger number of experimental animals, and of control animals as well, before any definite conclusions can be arrived at.

II. The author gives a short account of observations made on the microscopical appearance of the host tissues at the points of attachment of ten species of parasitic worms.

Results of the examination of five different cestode infestations may be summarised as follows :—

*Hymenolepis erinacei* in the small intestine of the hedgehog, *Hymenolepis nana* in the small intestine of the Chinese hamster and an unidentified cestode in the small intestine of the flamingo produced insignificant lesions only ; the epithelium was seen to be broken at the points of attachment and the scolices of the worms to have penetrated deeply into the mucous membrane, but there was no evidence of any cellular infiltration around the scolex.

An examination of the nodules produced by *Raillietina echinobothrida* in the fowl showed that the parasites had penetrated the mucosa and submucosa and fixed themselves in the muscular tissue. In addition to the scolices of the worms the nodules contained caseous material which was seen to be surrounded by giant cells and irregular protoplasmic masses containing large nuclei. In some nodules the muscular layers of the intestine were still present, but in others they had completely disappeared and only the peritoneal layer remained.

The examination of a plerocercoid of *Diphyllobothrium latum* in the eel-pout showed it to be surrounded by a fibrous capsule. In addition to the parasite, this capsule contained a homogeneous mass in which were scattered more or less degenerated nuclei. The muscle fibres of the host immediately surrounding the cyst were, however, unchanged.

Three trematode infestations were examined in the same way. The effects of infestation by *Cotylurus platycephalus* in the intestine of a gull and by *Cotylurus cornutus* in the intestine of the domestic duck proved to be very similar. The mucous membrane of the intestine was seen to be drawn very powerfully into the cup-shaped anterior part of the worm and, in the case of *C. cornutus*, the

layer coming into immediate contact with that part appeared to have undergone some degenerative changes, probably in the nature of an extra-intestinal digestion.

Nodules in the intestinal wall of a stork containing a species of *Chaunocephalus* were examined and it was found that the muscular layers of the intestine had been almost completely destroyed. The parasites were surrounded by a mass of degenerating cells and the walls of the nodules showed an infiltration of small mononucleated round cells and of eosinophiles.

Similar observations were made on two nematode infestations. *Physaloptera clausa* in the stomach of the hedgehog was found with its head deeply embedded in the mucous membrane, but not reaching as far as the submucosa. Immediately around the head of the worm the tissue appeared to have lost its cellular structure and some material having the same homogeneous appearance was seen between the lips of the worm and in the lumen of the œsophagus. *Physaloptera caucasica* in the small intestine of a monkey was observed to have the same effect as the previously mentioned species, and it is thought that these two worms produce extra-intestinal digestion of their food material.

E. L. TAYLOR.

REBRASSIER, R. E., & MCCRORY, B. R. (1931). **A Study of Immunity or Resistance to *Ascaridia lineata* (Schneider).**—*J. Amer. Vet. Med. Ass.* **79.** 349-358. 3 tables. [12 refs.]

Three groups of 48 chickens each, of different ages (46, 97 and 131 days old respectively), were divided into three lots in each group. The first lot of each group was fed with 500 embryonated eggs after having been injected with 1 c.c. of an extract of the adult parasite ; the second lot was given the eggs only ; the third lot in each group was the control. The chickens were killed three weeks later. The feeding during the experiment was identical for all groups.

The results were not very conclusive, but it was found that in the youngest group the controls made the greatest gain in weight, while the lot receiving eggs only made the least. Similar but less marked results were obtained in the middle group, while there was no noticeable difference in the oldest group. The parasitised birds of the younger groups did not eat so much food as the controls. Most of the birds in the youngest group which received ova only developed an enteritis ; in those birds which received extract as well as ova, fewer birds showed this symptom and it was milder in type.

T. W. M. CAMERON.

FRY, W., & STEWART, J. T. (1931). **Studies on *Ælurostrongylus abstrusus* (Railliet, 1896) Cameron, 1927.**—*J. Parasitol.* **18.** 34-39. 3 figs. 2 tables. [8 refs.]

This is the first record of the lungworm of the cat from North America. The investigations of Fry and Stewart are in agreement with those of CAMERON except that they find that the larvae which are passed in the droppings of the cat are rather more resistant to freezing than he had found them. The parasitic stages in the mouse were not studied.

T. W. M. CAMERON.

KOMAROV, A., & BEAUDETTE, F. R. (1931). **Ornithostrongylus quadriradiatus in Squabs.**—*J. Amer. Vet. Med. Ass.* **79.** 393-394. [2 refs.]

This is the record of three outbreaks of disease in pigeons attributed to the trichostrongyle worm, *O. quadriradiatus*, found in the small intestine. In the

first outbreak, 44 out of 50 pigeons died with symptoms of a parasitic enteritis ; the other outbreaks involved the deaths of 20 and 17 pigeons out of flocks of 100 and 17 respectively.

T. W. M. CAMERON.

I. Okada, R. (1931). **Experimental Studies on the Oral and Percutaneous Infection of** *Ancylostoma caninum.* **First Report.**—*Jap. J. Exp. Med.* **9.** 209-222.

II. Okada, R. (1931). **Experimental Studies on the Oral and Percutaneous Infection of** *Ancylostoma caninum.* **Second Report. Destiny of mature Larvae of** *Ancylostoma caninum* **infected Orally and Percutaneously.**—*Ibid.* 223-235. 4 tables.

III. Okada, R. (1931). **Experimental Studies on the Oral and Percutaneous Infection of** *Ancylostoma caninum.* **Third Report.**—*Ibid.* 237-267. 6 tables.

IV. Okada, R. (1931). **Experimental Studies on the Oral and Percutaneous Infection of** *Ancylostoma caninum.* **Fourth Report.**—*Ibid.* 269-280. 3 tables.

Okada finds that oral infection by *A. caninum* is more effective in pups than in old dogs, that percutaneous infection is apparently more effective than oral infection (II), and that larvae passed *per anum* are still infective. Development up to seven days is more rapid after percutaneous than after oral infection (IV).

T. W. M. CAMERON.

Smit, H. J., & Notosoediro, R. (1931). *Thelazia callipaeda.—Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 328-332. 1 fig.

The authors give a description and figures of worms found in the conjunctival sac of an airedale terrier born in Java.

The male worm is described, and the authors point out how their observations differ in certain respects from previous records. In particular, they describe ten pairs of pre-anal papillae.

A. LESLIE SHEATHER.

I. Stehle, M. (1931). Ueber Trichinose bei wilden Tieren and ihre Uebertragung auf den Menschen. [**Trichinosis in Wild Animals and its Transmission to Man**].—*Zeitschr. Infektkr.* **39.** 320-329. [21 refs.]

II. Schmey, Voigt, & Conradi. (1931). Arbeitszeitverbrauch bei der Trichinenschau. [**The Timing of the Work in Trichinosis Inspection**].—*Arch. wiss. prakt. Tierhlk.* **63.** 352-355. 8 tables.

I. The beneficial results of the trichinosis regulations leave no doubt as to their value for the control of the disease in man. There is, however, a loophole in the law operating at the present time in that the flesh of certain wild animals which are known to be capable of transmitting infection is not included. The author quotes several records of the finding of trichinae in wild animals, three species of bear, the polecat, pine martin, hedgehog, fox and badger being mentioned. Trichinosis in man is known to have resulted from eating the flesh of bears, badgers, foxes and of pigs which have been fed on fox flesh. Finally, he gives an account of the recent epidemic of trichinosis in Stuttgart in which 69 persons were

affected and 12 died as a result of eating bear flesh. The proprietor of the eating house, which was the centre of infection, in this instance made enquiries as to whether bear flesh came within the trichinosis regulations, and was informed that its inclusion was not clearly stated. From a survey of this epidemic, it is clear that bear flesh should definitely be included in the trichinosis regulations and it appears highly desirable also to include the flesh of all kinds of wild animals known to be carriers of infection.

II. The trichinosis inspectors in Germany work according to strict regulations as to the order of procedure, the speed at which the examinations shall be carried out and the maximum number which may be done in the course of a day's work. It has been suggested that these regulations might be improved and arrangements were made for an enquiry into the methods at present employed.

The following three questions show the direct object of the investigation :— (1) Is the time of six minutes for each pig necessary ? (2) Does fatigue appear and what is its significance ? (3) Does the present rule of 60 examinations a day produce overstrain of the workers and is it necessary to lower the number ?

For the purpose of answering these questions extensive data were collected from the observation of 14 trichinosis inspectors of different ages and working under various conditions ; the tables reproduced in this paper represent only a small proportion of the whole data.

It was concluded that the time of six minutes allowed for the examination of each pig must be maintained. At this rate the examination of 66 pigs can be carried out in the course of a day's work without evidence of fatigue on the part of the workers. It is thought that the general limit for the number of examinations in a day should be 60, but that it may occasionally be raised to 70 as circumstances require.

E. L. TAYLOR.

HUNTER, G. W. (1931). **Human *Trichinella spiralis* Infection and the Bachman Precipitin Test.**—*Amer. J. Hyg.* **13.** 311-319. 1 table. [11 refs.]

The author of this paper gives an account of a few trials which he carried out on the value of the BACHMAN precipitin test for the diagnosis of human trichinosis. The antigen which he used was provided by BACHMAN who also carried out independent tests with the author's material, the results obtained in both series of tests being discussed in this paper.

In none of the six test cases of trichinosis was the presence of trichinae actually demonstrated, but the account which is given of their histories and of the symptoms leaves little doubt that they were true cases of the disease.

Summarising the technique followed, the author says,

" In making the test, tubes of a small diameter should be used, such, for example, as might be made by sealing off ordinary glass tubing. At least fifteen or so should be used in each series. An equal amount of serum is added to each tube and the test antigen (*Trichinella spiralis* protein extract) is added in varying dilutions from 1 : 500 to 1 : 200,000 or more. Coca's solution is used as a diluent for the test antigen. This solution may be made up by taking 0·05 g. $NaHCO_3$, 0·5 g. NaCl, 0·4 g. $C_6H_5OH$ in 100 c.c. of distilled water. After the diluted antigen is carefully layered upon the serum it is necessary to subject the test tubes to a water bath of 37°C. for 20 to 30 minutes when the tubes should be read, allowed to stand and re-read at the end of 30 minutes and an hour. A clear ring at the interspace of the antigen and serum constitutes a positive test."

The author's and BACHMAN's results were in complete agreement in five of the six test sera which were examined. Positive results were obtained by both

investigators with three samples of sera collected about four months after infection had taken place, and negative results were obtained by both with two samples collected three and five weeks after infection. They disagreed over one sample of serum, collected about six months after infection. These negative reactions in presumptive cases of trichinosis are thought to be due to the occurrence of a flocculation phenomenon which at times greatly interferes with the reading of the test.

Although the BACHMAN precipitin test is in no way fitted for early diagnosis, the author considers that it offers great possibilities for the detection of trichinosis of long standing and, from the patient's point of view, is much to be preferred to the biopsy of portions of striped muscle. He also considers that it may prove of considerable value in the field of meat inspection by making possible the detection of trichinosed pork before slaughter.

E. L. TAYLOR.

SCHWARTZ, B., & PRICE, E. W. (1931). **Infection of Pigs through the Skin with the Larvae of the Swine Kidney Worm, Stephanurus dentatus**—*J. Amer. Vet. Med. Ass.* **79.** 359-375. [9 refs.]

The authors find that, when placed on the intact skin of pigs, the larvae fail to penetrate the skin, although they will readily do so when the cuticle is even lightly scarified. The larvae pass to the lungs, liver, kidneys, perirenal tissues and other organs in the abdominal and thoracic cavities. They apparently reach the liver through the systemic circulation and many of them remain in the hepatic blood vessels, where they produce thrombi; leaving the vessels they penetrate the hepatic tissue and, working their way to the liver capsule, they penetrate it and migrate freely in the abdominal cavity. They reach the perirenal tissue relatively late, and encyst, the cysts having openings into the ureters. A similar development follows ingestion of the larvae. Larvae which pass to other organs have gone astray and do not develop; they may, however, cause the production of cysts in the various organs.

T. W. M. CAMERON.

I. DÉVÉ, F. (1931). Du rôle provocateur de la bile dans l'édification de la membrane d'enkystement du cholépéritoine hydatique. [**On the provocative Action of Bile in the Formation of the Cyst Membrane of Choleperitonitic Hydatid**].—*C.R. Soc. Biol. Paris.* **108.** 369-370. [3 refs.]

II. DÉVÉ, F. (1931). Echinococcose péricardique expérimentale. [**Experimental pericardic Hydatid**].—*Ibid.* 639-641. [2 refs.]

III. DÉVÉ, F. (1931). Au sujet de la toxicité locale comparée de l'échinococcose hydatique et de l'échinococcose alvéolaire. [**On the comparative local Toxicity of hydatid and alveolar Echinococcosis**].—*Ibid.* 687-688. [3 refs.]

I. A case observed by the author showed that it was the bile, not the various parasitic elements, which caused the production of the false membrane when a hydatid cyst ruptured from the liver into the peritoneal cavity.

II. The author draws attention to the fact that multiple hydatid cysts of the heart ought to awaken the idea of secondary hydatid of the pericardium. He describes an experimental inoculation in the rabbit, in the cardio-pericardic

region, where the needle had touched the heart. In 19 months, the right thorax was filled with a large cyst, while in the middle of the false epicardic membranes, on the anterior face of the infundibulum of the pulmonary artery, was a hydatid about the size of a large pea.

III. The local toxicity of normal hydatid in man appears to be less than that observed in alveolar hydatid. This appears to be due, however, to the fact that in the first case cuticulisation is rapid and complete, while in the second, owing to the protoplasmic processes, the necrotic poisons are continually brought into contact with the host tissue.

T. W. M. CAMERON.

I. Williams, C. L. (1931). **Cestodes from the Eastern Wild Turkey.**—*J. Parasitol.* **18.** 14-20. 8 figs. [4 refs.]

II. Smit, H. J., & Ihle, J. E. W. (1931). Ueber das Vorkommen von Thelazia rhodesi (Desmarets) beim Pferde im Indischen Archipel. [**The Occurrence of *Thelazia rhodesi* in the Horse in the Indian Archipelago**].—*Zlb. Bakt. I.* (*Orig.*). **121.** 420-421. [5 refs.]

I. Three bottles of cestodes collected from the eastern wild turkey, *Meleagris gallopavo silvestris*, were found to contain *Metroliasthes lucida* and two species of *Davainea* which do not appear previously to have been described. These two new species are here described under the names *Davainea ransomi* and *D. fuhrmanni*.

*D. ransomi* is characterised by its small size and resembles *D. anatina* and *D. mutabilis* more closely than other members of the genus; *D. anatina* differs, however, in having fewer and larger hooks and a scolex of wider diameter, and *D. mutabilis* in having fewer hooks, which are twice as long as those in *D. ransomi*.

*D. fuhrmanni* resembles *D. undulata* and *D. appendiculata*, but may be distinguished from *D. undulata* by its larger hooks and from *D. appendiculata* by the larger number of hooks on the rostellum and by having 12 to 13 rows of hooks in the suckers instead of only 7 as have been described in *D. appendiculata*.

II. Smit and Notosoediro (1930) reported the finding of *Thelazia* in the conjunctival sac of the horse in the Indian Archipelago. Further study has shown that the species is not *T. lacrimalis*, which has always been associated with this host, but is *T. rhodesi*, a species which up to the present has only been reported in the ox and buffalo. *T. rhodesi* is redescribed from the author's material and it is pointed out that an aberrant form of *T. lacrimalis* has previously been observed in the horse in India. In view of the present findings it is probable that this form was also referable to *T. rhodesi*.

E. L. TAYLOR.

Conklin, R. L., & Baker, A. D. (1931). **Presence of the Lancet Fluke, *Dicrocoelium dendriticum* (Rudolphi, 1819) in Canada.**—*J. Parasitol.* **17.** 18-19.

Conklin and Baker record the lesser liver fluke from sheep from Quebec. The sheep had been brought in from Nova Scotia where the parasite was also afterwards found. They also record it from the liver, bile and pancreatic ducts and duodenum of a mink from Prince Edward Island. This appears to be the first record of this parasite from North America.

T. W. M. CAMERON.

## DISEASES, GENERAL.

Fooy, J. P. (1931). Het witte Bloedbeeld bij Malleus en Saccharomycosis. [**The Leucocyte Picture in Glanders and Epizootic Lymphangitis**].—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 258-301. 1 plate.

Having emphasised the importance of the study of the leucocytes in human medicine, the author gives an account of his examinations of blood from animals affected with glanders or with epizootic lymphangitis. For the simple enumeration of the corpuscles the author uses citrated blood in a Thoma-Zeiss counting chamber, and for their differential examination he employs Giemsa diluted with a solution composed of 6 c.c. of N/15 disodium hydrogen phosphate and 4 c.c. of N/15 dipotassium hydrogen phosphate.

He summarises the views of various authors regarding the normal leucocyte formula of horses and discusses the different nomenclatures which have been adopted.

Blood examinations have been made from four groups of animals :—(a) horses clinically affected with glanders ; (b) horses reacting to mallein and giving positive serum tests, but showing no clinical evidence of disease ; (c) horses reacting to mallein, but showing no clinical evidence of infection, and (d) horses affected with epizootic lymphangitis.

As glanders is prevalent in the Dutch East Indies, only clinical cases are slaughtered. Reacting animals which are apparently healthy are used for work, but they have to be kept under licence by the police authorities.

In clinical cases of glanders, the author found that there was an increase in the number of leucocytes in the blood and that this increase involved both the neutrophile leucocytes and the lymphocytes. The eosinophiles either disappeared completely or were present only in very small numbers. Similar results were obtained with blood from clinically healthy animals which reacted to mallein and gave positive serum tests.

On the other hand, animals which appeared to be healthy and yielded negative results with mallein gave normal leucocyte counts while reacting positively to serum tests.

In two experimentally infected animals, a change in the leucocyte count could be detected before the animals gave positive reactions to mallein or to serum tests. Animals affected with epizootic lymphangitis showed little variation from the normal.

A. LESLIE SHEATHER.

Grau, H. (1931). Fremdkörper und Parasiten in den Tonsillarkrypten des Pferdes. [**Foreign Bodies and Parasites in the Tonsillar Crypts of the Horse**].—*Berl. tierärztl. Wschr.* **47.** 779-780. 1 fig. [8 refs.]

The author examined the tonsillar crypts of 80 horses killed for meat. In many cases he found fragments of food matter, calculi and minute stones and, in one case, larvae of *Rhinoestrus purpureus* Brauer.

In the older horses, the presence of foreign bodies had caused slight irritation and inflammation.

J. T. E.

MINETT, F. C. (1931). **Bovine Mastitis. A Short Review of Present Knowledge.** —*J. Dairy Res.* **2.** 84-90. [51 refs.]

This short review summarises knowledge of the subject under the following headings :—Distribution and Economic Importance, Forms of Mastitis, Method of Spread of Mastitis, Diagnosis of Mastitis, Control of Mastitis.

A bibliography of 51 selected works is appended.

F. C. MINETT.

MINETT, F. C. (1931). **The Importance of Studying the Diseases of the Cow's Mammary Gland.** *Paper read at the Centenary Meeting of the British Association for the Advancement of Science, 1931.* Précis in *Rep. of Centenary Meeting B. A. A. S.* p. 516. Paper reprinted *in extenso* in *Vet. Rec.* **11.** 1165-1167.

The subject is considered from three points of view, *viz.*, the agricultural, the public health and the pathological aspect.

THE AGRICULTURAL ASPECT.—Of the various kinds of udder disease, that which causes the greatest loss to agriculture is a chronic form due to streptococci. As illustrating the prevalence of this form, it is mentioned that, in a series of just over 1,100 cows belonging to 20 herds in Great Britain, 446, or about 40 per cent., were infected in one or more quarters, the incidence in each herd varying from 11 to 65 per cent. In most of these cases obvious clinical signs were absent. It is unlikely that the high average incidence of infection was due to the herds having been in some measure selected. Actually, of the 20 herds, five were producing certified milk and eight others could be classed as " clean." It is also improbable that mastitis is more widespread in Great Britain than in other countries engaged in intensive milk production.

The extreme prevalence of udder disease is not the sole cause of its importance to agriculture. Thus, the incidence of chronic streptococcus mastitis is greatest in cows which on account of their age have reached a high level of milk production. There is also the excessive herd wastage, the depreciation in the value of the infected animal and the expense of maintaining a larger number of animals than would otherwise be required. Finally, it cannot be doubted that at least some forms of mastitis are contagious.

THE PUBLIC HEALTH ASPECT.—The responsibility for producing a clean and safe milk supply should be shared by the producer and the distributor.

In the past, except for tuberculosis, the importance of udder disease in relation to the hygienic quality of the milk has not received the attention it merits. The reasons for this neglect are discussed in the paper. Nevertheless, it is undesirable that milk from cows with mastitis should reach the consumer, because, although it may not be grossly abnormal in appearance, it may contain large numbers of bacteria, usually streptococci, as well as the products of tissue reaction. Such milk may be not only unpalatable, but also unfit for the manufacture of milk products.

The principal epidemic diseases, which from time to time have been attributed to the consumption of milk, are typhoid and paratyphoid fevers, diphtheria, summer diarrhœa in infants, scarlet fever and septic sore throat. In the case of the three first-named the cow does not commonly play a principal share. With scarlet fever and septic throat, there is definite evidence that some outbreaks have been caused by contamination of the milk at its source. In these cases the epidemiological history points forcibly to an actual infection of the cow's udder with pathogenic streptococci, derived in the first instance from man. It has

been shown by several authors that infection of the cow's udder with hæmolytic streptococci indistinguishable from *S. pyogenes* of man is certainly more common than was at one time believed, but such infection is not always associated with epidemics among the human population.

THE PATHOLOGICAL ASPECT.—Attention is directed to the fact that pathogenic bacteria, e.g. *Br. abortus*, *B. pyogenes* and streptococci, are sometimes excreted *via* the mammary gland. Hence, a bacteriological study of the milk may throw light upon disease processes taking place elsewhere in the body. It is also pointed out that a knowledge of the bacterial flora of the udder in health and disease is an essential preliminary to such studies as the physiology of the gland and the influence of various factors upon milk yield or composition. Finally, from the standpoint of the experimentalist, the mammary gland would appear to afford a useful opportunity for the comparative study of various problems in biology.

F. C. MINETT.

MÜLLER, J., & BECK, J. (1931). Schwanz- und Sphinkterlähmung (Neuritis caudae equinae) bei Kühen. **(Tail and Sphincter Paralysis in Cows].**—*Deuts. tierärztl. Wschr.* **39.** 609-613. 3 figs. [9 refs.]

The authors describe three cases of a condition seen in cows at the Cattle Disease Clinic of the Hanover Veterinary College. They believe that the condition is pathologically the same as that seen in the horse, as described by various authors. The literature is reviewed.

The paralysis was observed in three and a half year old cows in mid-gestation shortly after they had been put on pasture. All the animals possessed a short sacrum and a sunken tail root, which factors the authors believe to be significant in the condition. There was paralysis of the tail and of the sphincter muscles of the rectum and bladder, together with unsteadiness and weakness of the hind limbs. Following its sudden onset, the disease took a chronic course and recovery occurred after several days. The diagnosis of *neuritis caudae equinae* was based on clinical grounds.

J. T. E.

GUNDEL, M. (1931). Epidemiologie, Pathogenese und specifische Therapie der Pneumonie. **[Epidemiology, Pathogenesis and Specific Therapy of Pneumonia].**—*Zlb. Bakt. I. (Orig.).* **122.** 112-131.

This paper deals with the differentiation of the types of pneumococci responsible for pneumonia in the human subject and with the percentage of cases caused by each type.

Treatment with antisera is also discussed and the results are tabulated.

A. LESLIE SHEATHER.

FINDLAY, G. M., & DALLING, T. (1931). **Encephalitis in Marek's Fowl Paralysis.**—*Trans. Roy. Soc. Trop. Med. Hyg. Lond.* **25.** 1.

In 1907, MAREK described an epidemic disease of fowls under the terms " fowl paralysis " or " neuro-lymphomatosis." The disease is said to occur in Europe, the United States of America and in Great Britain. The authors state that the causal agent has not yet been determined, but that it is most probably an ultra-microscopic virus.

Pathologically, the disease is characterised by tumour-like growths on the peripheral nerves and by an encephalomyelitis.

[There is no definite proof that the paralysis in fowls observed during recent years in America and in Great Britain is identical with that described by MAREK and there is no reliable evidence that the causal agent is a virus. Further investigation is essential before these questions can be settled.]

T. M. DOYLE.

COLES, J. D. W. A. (1931). **An Unknown Intracellular Organism of the Conjunctival Epithelium of Sheep. Preliminary Report.**—*17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa.* Part 1. pp. 187-189. 2 figs [1 ref.] Pretoria : Govt. Printer.

The author records the occurrence of an intracellular, gram-negative, non acid-fast micro-organism, averaging 1·2 to 1·0 $\mu$ in size, presenting rounded or slightly elongated or even comma-shaped forms and occurring in numbers up to 60 individuals which are scattered more or less evenly throughout the cytoplasm of the epithelial cells of the conjunctiva of apparently normal eyes of sheep.

The micro-organism has not been cultivated. Its nature is unknown.

A. D. MCEWEN.

RATCLIFFE, H. L. (1932). **Tumors in Captive Primates. Report of Two Cases.**—*Amer. J. Path.* **8.** 117-121. 6 figs. on 1 plate. [3 refs.]

DE MONDBREUM, W. A., & GOODPASTURE, E. W. (1932). **Infectious Oral Papillomatosis of Dogs.**—*Ibid.* 43-55. 12 figs. on 4 plates. [21 refs.]

HADWEN, S. (1932). **The Melanomata of Grey and White Horses.**—*Canad. Med. Ass. J.* **25.** 519-530. 27 figs. on 3 plates. [19 refs.]

In the first paper two cases of malignant epithelial tumours in monkeys are described. One case was from a female yellow baboon, *Papio cyncocephalus*, age unknown, but this animal had lived at the Zoological Gardens for eighteen years. An early adeno-carcinoma involving the pancreas was observed. Histologically, the tumour showed replacement of the parenchyma by small duct-like structures lined by elongate pale staining cells with vesicular nuclei, hyperplasia of the epithelium of the inter- and intra-lobular ducts, interlobular fibrosis and small hæmorrhages with eosinophil and neutrophil infiltration ; mitoses were rarely seen. In this animal there was also found an endometrial cystadenoma growing from the mucosa of the right tube and extending into the uterine cavity. The second case described was an epidermoid carcinoma of the œsophagus in a Japanese macaque, *Macacus fuscatus*. This animal had lived for 15 years in the Garden, but had been in poor health for over two years before death. The tumour involved the lower part of the œsophagus and extended into the stomach.

The second paper deals with the infectious papillomata in dogs. A review of the literature is given and cases of oral papillomatosis are described. The infectious nature was proved by inoculating scarified buccal mucous membranes of puppies with a paste made by grinding pieces of the wart tissue in a mortar containing small amounts of sterile sand and physiological saline solution. One inoculation was sufficient, the average incubation period being from 30 to 33 days. Regression occurred between the third and fifth month following inoculation. Rats, mice, rabbits, guinea pigs, kittens and monkeys were immune to

inoculation. In puppies the disease was easily transmissible by means of Berkefeld filtrates obtained from the lesion. The virus possessed a high degree of specificity, apparently only affecting the oral mucous membranes. The virus could be preserved for long periods in equal parts of glycerol and saline or by drying the infective tissue *in vacuo* while frozen. Subjection of the virus to a temperature of 58°C. for one hour rendered it non-infectious, but it was not killed at 45°C. for a similar period. Attempts to reinfect puppies after regression had occurred were made with unsuccessful results. The general histological characteristics of the lesion were very similar to those of human warts. Basophilic intra-nuclear bodies, similar to the Lipschütz bodies of human warts, occurred in a few of the large wart cells of the older lesions. Their connection with the etiological agent of the disease remains to be proved.

The third paper deals with that much discussed subject, the melanomata. The author very briefly refers to the conclusions of certain authorities concerning the function of the pigment in the skin and the origin of the melanomata in man and animals, and concludes that animals are coloured primarily for reasons connected with their health. Horses which whiten with age are predisposed to melanomata ; few animals become incommoded with the tumours until they reach old age. The production of freckles in horses' skin is discussed along with their relation to melanotic growths. Brief histological descriptions are given of the normal appearances of the epidermis in horses and of the effect of leucoderma on the cells of the epidermis and of melanotic deposits in various tissues. [See also Foot, N. C. (1931). *Amer. J. Path.* **7.** 619.]

J. R. M. INNES.

## IMMUNITY.

Gratia, A., & Linz, R. (1931). Note préliminaire sur le phénomène de Shwartzman. [**Preliminary Note on Shwartzman's Phenomenon**].—*C.R. Soc. Biol. Paris.* **106.** 1290-1292. [3 refs.]

Gratia, A., & Linz, R. (1931). Phénomène de Shwartzman et toxicité primaire. [**Shwartzman's Phenomenon and Primary Toxicity**].—*Ibid.* 1293-1294.

Gratia, A., & Linz, R. (1931). La transmission passive du phénomène de Shwartzman. [**Passive Transmission of Shwartzman's Phenomenon**].—*Ibid.* **107.** 234-235. [1 ref.]

Gratia, A., & Linz, R. (1931). Phénomène de Shwartzman et anaphylaxie. [**Shwartzman's Phenomenon and Anaphylaxis**].—*Ibid.* 236-238.

The authors describe some experiments and theories concerning the relationship between Shwartzman's phenomenon, Sanarelli's reaction and anaphylaxis. [Shwartzman's phenomenon is observed in rabbits when a filtrate of certain microbial cultures is inoculated intradermally ; the intravenous injection of the same filtrate, 20 to 48 hours later, provokes a hæmorrhagic skin reaction at the site of the intradermal injection. Sanarelli's reaction occurs when the injection of a live cholera culture into a rabbit is followed, 24 hours later, by (apparently) any microbial filtrate injection ; a hæmorrhagic reaction, frequently fatal, is produced in the intestines.]

Shwartzman considered his reaction as distinct from anaphylaxis because it was neither specific nor passively transmittable and could only be produced by microbial filtrates. The authors, however, describe experiments in which they were able to obtain passive transmission of the phenomenon by inserting a piece of sponge in the skin at the site of intradermal inoculation ; it was possible

to obtain the reaction in an animal inoculated with the juice, expressed from this sponge, by a " detector " injection two to six hours later. They were also able to sensitize a rabbit to a *B. coli* Shwartzman's reaction by the intradermal injection of ricin. They used the ear of a rabbit as a site of skin injection and were able to follow the vascular reaction very closely ; they were also able to produce the reaction although less marked, in guinea pigs. They discuss the relationship between primary toxicity and the intensity of the reaction which, according to BURNET, is connected with endotoxin formation.

The authors consider the three reactions to be very closely allied and describe a marked Shwartzman's reaction in a rabbit in which the character of the blood changes was analogous to that seen in anaphylaxis, although of longer duration. They also found it possible to desensitize guinea pigs against anaphylactic shock by means of Shwartzman's reaction. The intravenous injection of Roskam's anti-platelet serum increased the intensity of the reaction.

NORMAN HOLE.

CRUVEILHIER, L., NICOLAU, S., & KOPCIOWSKA, L. (1931). Influence de la vaccination antirabique sur le taux des agglutinines antityphiques chez le Lapin immunisé contre Bacille d'Eberth. **[The Influence of Anti-Rabies Vaccination on the Amount of Anti-Typhoid Agglutinins in the Rabbit immunized against** *Bact. typhosum*].—*C.R. Soc. Biol. Paris.* **107.** 212-216. 4 figs. [1 ref.]

A series of rabbits was injected intraperitoneally with three or four doses of anti-typhoid vaccine at weekly intervals. At the time of the first injection, some rabbits were injected subcutaneously with a brain tissue suspension from a rabbit which had died of rabies, some with a suspension of brain tissue from a normal rabbit, some received saline injections and others were left as controls. The injections were repeated daily for from 17 to 25 days. Samples of blood were taken and the titre for agglutinins against *Bact. typhosum* assessed.

The rabbits inoculated with the rabies brain tissue responded by giving a much higher titre for *Bact. typhosum* whilst those inoculated with normal brain tissue gave a lower titre, but higher than that of the controls. Further experiments showed that injections of such rabid brain tissue would restimulate the production of agglutinins in rabbits in which the titre had fallen considerably. The authors consider that the nervous tissue plays some part in the general defence mechanism of the animal.

R. LOVELL.